506
NES
v. 33
cop. 2

590.6
W14

Issued June 11th, 1908.

Vol. XXXIII.
Part 1.

No. 129.

THE

PROCEEDINGS

OF THE

LINNEAN SOCIETY

OF

NEW SOUTH WALES

FOR THE YEAR

1908.

PART I. (pp. 1-208),

Containing Papers read in

MARCH to APRIL (in part).

WITH TWO PLATES.

HENRY B. WARD
STATE UNIVERSITY,

SYDNEY:
PRINTED AND PUBLISHED FOR THE SOCIETY
BY
F. CUNNINGHAME & CO., 146 PITT STREET,
AND
SOLD BY THE SOCIETY.

[Price, 7/-]

AGENTS IN EUROPE
Messrs. DULAU & Co., 37 Soho Square, London, W.
Messrs. R. FRIEDLÆNDER & SOHN, Carlstrasse 11, Berlin, N.W.

NOTICE.

With the exception of Volumes I.-VI. of the Proceedings—of which the Society's stock was totally destroyed in the Garden Palace Fire—the Publications of the Linnean Society of N.S.W. may be obtained at the Society's Hall, Ithaca Road, Elizabeth Bay, Sydney, from Dulau & Co., 37 Soho Square, London, W., or R. Friedländer & Sohn, Carlstrasse 11, Berlin, N.W., at the following prices:—

First Series.

Proceedings for 1882, Vol. VII.—Part 1, 7s. 6d.; Part 2, 10s.; Part 3, 5s.; Part 4, 10s.

Proceedings for 1883, Vol. VIII.—Part 1, 10s.; Part 2, 5s.; Part 3, 7s.; Part 4, 8s.

Proceedings for 1884, Vol. IX.—Part 1, 8s.; Part 2, 12s.; Part 3, £1 5s.; Part 4, £1 5s.

Proceedings for 1885, Vol. X.—Part 1, 12s.; Part 2, 7s. 6d.; Part 3, 15s.; Part 4, 17s. 6d.

Second Series.

Proceedings for 1886, Vol. I.—Part 1, 10s. 6d.; Part 2, 12s.; Part 3, 13s.; Part 4, 12s. 6d.

Proceedings for 1887, Vol. II.—Part 1, 7s.; Part 2, 8s.; Part 3, 12s.; Part 4, £1 7s.

Proceedings for 1888, Vol. III.—Part 1, 15s.; Part 2, £1 4s.; Part 3, £1; Part 4, 18s.

Proceedings for 1889, Vol. IV.—Part 1, 11s.; Part 2, 16s.; Part 3, 19s.; Part 4, 11s.

Proceedings for 1890, Vol. V.—Part 1, 11s.; Part 2, 9s.; Part 3, 9s.; Part 4, 9s.

Proceedings for 1891, Vol. VI.—Part 1, 10s.; Part 2, 9s. 6d.; Part 3, 17s.; Part 4, 7s. 6d.

Proceedings for 1892, Vol. VII.—Part 1, 6s. 6d.; Part 2, 4s. 6d.; Part 3, 8s.; Part 4, 8s.

Proceedings for 1893, Vol. VIII.—Part 1, 5s.; Part 2, 11s.; Part 3, 6s.; Part 4, 9s.

Proceedings for 1894, Vol. IX.—Part 1, 12s.; Part 2, 12s.; Part 3, 13s.; Part 4, 8s.

Proceedings for 1895, Vol. X.—Part 1, 15s.; Part 2, 8s. 6d.; Part 3, 10s., Supplement, 1s. 6d.; Part 4, 12s.

Proceedings for 1896—Part 1, 9s., Supplement, 2s. 6d.; Part 2, 6s. 6d.; Part 3, 7s. 6d.; Part 4, £1 7s. 6d.

Proceedings for 1897—Part 1, 10s.; Part 2, 8s. 6d.; Part 3, 9s.; Part 4, 12s. 6d.

Proceedings for 1898—Part 1, 3s.; Part 2, 6s.; Part 3, 12s.; Part 4, 14s.

Proceedings for 1899—Part 1, 12s. 6d. Part 2, 12s.; Part 3, 10s.; Part 4, 10s. 6d.

506
NES
v.33
cop.2

PROCEEDINGS

OF THE

LINNEAN SOCIETY

OF

NEW SOUTH WALES,

WEDNESDAY, MARCH 25TH, 1908.

The Thirty-third Annual General Meeting, and the Ordinary Monthly Meeting, were held in the Linnean Hall, Ithaca Road, Elizabeth Bay, on Wednesday evening, March 25th, 1908.

ANNUAL GENERAL MEETING.

Mr. A. H. S. Lucas, M.A., B.Sc., President, in the Chair.

The Minutes of the preceding Annual General Meeting (March 27th, 1907) were read and confirmed.

The President delivered the Annual Address.

PRESIDENTIAL ADDRESS.

The thirty-second volume of the Society's Proceedings—the visible fruitage of last year's work—has been completed in good time, and made available to you. On the whole it is a very satisfactory contribution to our knowledge of the Natural History of Australia and Oceania, in the broad interpretation of the term we are accustomed to give it; and I think we may

venture to say that it is a volume of which our Founder would have approved.

The Membership increased slightly during 1907, as ten Members were elected; two Members, one of them, Professor Liversidge, an Original Member, resigned in consequence of departures from Australia; and another of the dwindled little group of Original Members, Mr. David Scott Mitchell, deceased on 24th July. Professor Liversidge's connection with the University of Sydney dates from the year 1872, so that he has been closely identified with higher education and with scientific developments in New South Wales during the most expansive period of its history; and therefore we part with him with great regret.

Mr. David Scott Mitchell, M.A., whose association with the Society goes back to the 8th December, 1874, was born in Sydney in 1836. His second name recalls his relationship to the late Alexander Walker Scott, M.A., and his two accomplished daughters, Mrs. Morgan, recently deceased, and Mrs. Forde, the author and illustrators of that meritorious but, alas! uncompleted work "Australian Lepidoptera and their Transformations; drawn from the Life, by Harriet and Helena Scott; with Descriptions, general and systematic (7 Pts. 1864-98). Mr. Mitchell was one of the first batch of graduates of the University of Sydney, taking his B.A. in 1856, and his M.A. in 1859. In 1858 he was admitted to the Bar, but did not practise as he had inherited considerable private means from his father. Thereafter he devoted his time and energy to the conduct of his private affairs, and to the gratification of his individual tastes as a bibliophile and collector. The results of forty-five years' discriminating and unstinted collecting of books, pamphlets, manuscripts, pictures, &c., chiefly but not exclusively relating to Australasia, henceforth to be known as the Mitchell Library, were bequeathed to the State, together with the sum of £70,000 for endowment, upon certain conditions. The more important of these were that the individuality of the collection should be conserved, that it should be suitably housed in a separate wing of the contemplated National Library of the State, and that it should be main-

tained and rendered available to those who are competent to make use of it, under similar regulations to those which are in force in the British Museum Library.

The foundation stone of the Mitchell wing was laid by the Premier of the State, with appropriate ceremony on October 11th, 1906; and the edifice is now approaching completion. Meanwhile tenders for the erection of the main building have been accepted, so that in about three years hence, the Mother State of the Commonwealth may look forward to possessing a State Library which, to speak without boasting, will be a very marked advance upon the state of things existing hitherto.

Mr. Mitchell was a very reticent man upon the subject of the Mitchell Library, because he was an extremely modest man. His aim was not to be talked about for doing something; but to do something great because it was a fruitful thing to do. But we may hope that his modesty did not lead him to withhold the history of the accumulation of his unique collection, his knowledge of its special features, and the subjects of exceptional interest upon which its utilisation might be expected to throw light, or, in other words, the more important results of his own extensive knowledge of his unrivalled collection.

Mr. Mitchell did not add the pursuit of science to his accomplishments, so that we may reasonably attribute his sustained interest in this Society to that of the bibliophile in an Australian publishing organisation which began auspiciously, and showed promise of lasting. Be that as it may, the Society is honoured in having had among its Foundation Members, in the person of Mr. Mitchell, another brilliant example of the private individual possessed of wealth, who made it his very special care to start a prolific enterprise and to provide for its maintenance, for the benefit of those who came after him.

Dr. R. Greig-Smith, Macleay Bacteriologist to the Society, who departed for Europe, on leave, at the end of December, 1906, rejoined us again in October last. At the Society's Meeting on 30th October, Dr. Greig-Smith gave us an interesting summary of his impressions and experiences on visiting a number of the

more important bacteriological laboratories and institutions of the United Kingdom and on the Continent, during his tour. Since his return, our Bacteriologist has settled down to work again, and has been for some time engaged upon the very interesting study of certain points in connection with the opsonisation of Bacteria.

Mr. H. I. Jensen, Linnean Macleay Fellow in Geology, has completed his work on the geology of the Warrumbungle and Nandewar Mountains, and the results will be found embodied in two important papers included in the Proceedings for last year. In addition, Mr. Jensen has spent some time in Queensland investigating the geology of the Mount Flinders trachyte area; and also, in conjunction with Mr. C. A. Süssmilch, upon the study of the petrology of the rocks of the Canoblas, New South Wales. Considerable progress has been made with these investigations, and during the year Mr. Jensen expects to be ready with papers treating of these important matters. At the end of the month we part with Mr. Jensen as a Linnean Macleay Fellow, as he has decided to take up other work. He was the first Linnean Macleay Fellow to be appointed, and has held a Fellowship for three years. He accepted his Fellowship, and has carried on his work, in the spirit which prompted Sir William Macleay to found Fellowships—as an aid to do work; an aid to do work which could not be done so satisfactorily and promptly by anyone else, unless he were a leisured individual possessed of private means. Mr. Jensen undertook a big problem—the study of the natural history of the volcanic rocks, and particularly of the trachytes of Eastern Australia and cognate matters. He has investigated it with great enthusiasm and ability, both in the field and in the laboratory, and he has settled its main features. He has the satisfaction of having done an excellent piece of work; and in the name of the Society I cordially offer him hearty congratulations and good wishes for his prosperity and success in his new sphere of activity.

Dr. J. M. Petrie, Linnean Macleay Fellow in Biochemistry, has almost completed his first year of work. He has finished

his investigation of the new midriatic alkaloid, Solandrine, yielded by *Solandra lævis*, in so far as the material available has allowed him to do so. The results of this investigation will be found in the last Part of the Proceedings. In addition Dr. Petrie has had in hand two promising subjects for investigation, namely, the distribution of nitrogen in seeds, and the nature of the non-protein substances which appear to be mainly the products of decomposition of the proteins; and the nature of certain products obtainable from the Australian plant *Ochrosia*. Of course, in quantity of output, the Biochemist cannot hope to rival the geologist. I may add that the Council has reappointed Dr. Petrie to a Fellowship.

I have much pleasure in formally announcing to the Society the name of the Third Linnean Macleay Fellow, Mr. E. J. Goddard, B.A., B.Sc., whose appointment will date from the 1st proximo. Mr. Goddard took his B.Sc. degree in 1905, obtaining Professor David's Prize for Physiography in his first year, and Honours in both Biology, and Geology and Palæontology in his second and third years. Since 1904 he has filled the post of Junior Demonstrator in Biology at the University of Sydney, and for a time that of Acting Senior Demonstrator. Mr. Goddard has contributed a paper on "Foraminiferal Sand dredged twenty-two miles east of Sydney at a depth of eighty fathoms" to the Records of the Australian Museum (Vol.vi.pp. 305-311, 1907); and a paper entitled "Contributions to a Knowledge of Australian Foraminifera," written in collaboration with Mr. H. I. Jensen, B.Sc., will be found in last year's Proceedings (1907, p.291). He has been investigating Australian freshwater leeches (*Rhynchobdellida*), and will shortly communicate his results to the Society. Mr. Goddard will take up branch No. 5, General Biology, especially devoting himself to the study of the Freshwater Annulata of Australia. Trout are being introduced into our creeks and rivers in such a wholesale manner, that the welfare of the freshwater fauna of New South Wales and other States is being threatened very seriously, before any satisfactory systematic attempts have been made to estimate its character

and variety. Such investigations as Mr. Goddard has in view are urgently needed; and we earnestly hope that he will not find that trout and the operations of the river-dredger have had sufficient opportunity seriously to discount his efforts to make something of a question whose consideration has been delayed so long. For the purpose of making botanical and zoological collections, Mr. Goddard accompanied Dr. Woolnough on his second visit to Fiji in 1906, but has not yet been able to complete his account of them. In the name, and on behalf of the Society, I have great pleasure in wishing Mr. Goddard a very successful career.

It is with very great regret that I have to announce the contemplated early retirement of the Society's esteemed Hon. Treasurer, Mr. J. R. Garland, M.A., on account of delicate health. Since its foundation, four Honorary Treasurers have ably and successfully looked after the Society's finances; and, after the first, every one of them has had increased responsibility as compared with his immediate predecessor, concomitantly with the development of the Society's efficiency. Mr. Garland succeeeded the late Mr. Trebeck in August, 1901; and though he has encountered a maximum of work and responsibility it in no wise disconcerted him, until a break down in health enforced upon him the need of resting from his labours. He has been a man of few words, but an effective worker, thoroughly to be relied upon. Our retiring Treasurer deserves the Society's most hearty appreciation and gratitude for having so worthily maintained the succession, and developed and carried on the work of those who have from time to time undertaken the management of its finances with such satisfactory results. We regret very much to part with him in an official capacity, but still more do we regret the cause of the separation. I am very glad indeed to be able to announce a marked improvement in Mr. Garland's health, and I am sure that you will heartily join with me in wishing that it may continue until he is able to resume his accustomed avocations.

Our faithful old caretaker, Alfred Stapleton, and also his wife, died in October and August of last year, breaking up an associ-

ation with some member of the Macleay family, beginning with Mr. W. Sharp Macleay, or with the Society, of about half a century. The dwelling house has been renovated and improved, and one of Alfred Stapleton's sons—W. Stapleton—has been appointed to succeed his father, and gives promise of worthily doing so.

It is only on rare occasions that circumstances permit interruption of the regular, appointed procedure of the Society's work in such a manner as to provide an interlude of a less formal character, of which we can take full advantage. On October 31st, 1885, on the occasion of the dedication of the Hall in which we are now assembled, Sir William Macleay entertained the Members and other guests in characteristic fashion. On June 22nd, 1889, the Members of the Society had the pleasure of returning the compliment, on the occasion of the unveiling of the bust of Sir William Macleay, erected in the conspicuous place of honour which it has ever since occupied, by express wish of the donors. Nearly eighteen years elapsed without offering the Society another opportunity of meeting in its corporate character for some other purpose than merely routine business. On the 23rd May, 1907, the Bicentenary of Carl von Linné, the Society did its best, amid some drawbacks, to join in the world-wide recognition of the significance of the occasion, and to do homage to the memory of the remarkable man whose name the Society bears. I refer to then existing drawbacks, in order that I may mention that they have since vanished. I may remind you that Carl von Linné's only possible opportunity of seeing any example of Eastern Australian indigenous plants or animals would arise in connection with the visit of Sir Joseph Banks and Dr. Solander to New Holland on Captain Cook's First Voyage. In a letter to his friend, Mr. John Ellis, in London, Carl von Linné bitterly lamented that Solander's neglect to keep his promise to visit him on his return was bereaving him of his only chance of learning something of the productions of New Holland at first hand. He died without his desire being gratified. This explains how it is that Australian animals bearing

names bestowed by Carl von Linné are not indigenous and were first described and named from specimens brought from other countries which the species inhabit, as well as Australia. On this account, Australian naturalists have not that direct and inevitable interest in and concern with the Systema Naturæ as Carl von Linné left it, that naturalists of Europe, Asia, Africa and America have. The Australian naturalist's interest in the Systema, as far as strictly indigenous species are concerned, begins with the later editions. Hence it is that the works of Carl von Linné, and especially the earlier editions, are not so easily to be found in Australian libraries as in those of other countries. In our own case, too, one library, including about 1,000 volumes the cream of Sir William Macleay's private library, was destroyed by fire, and some of the works represented in that library have not been replaced. However, thanks to the liberality and kindness of Professor Fries, donor of his Biography of Carl von Linné, of the Royal Academy of Sciences of Stockholm, and of the Royal University of Upsala, our drawbacks in respect of want of literature have been largely if not altogether dissipated. [For a list of the memorial edition of a number of the works of Carl von Linné so presented, see pp.391, 932, 934 of Proceedings for 1907].

We have to regret that our distance from Europe left Dr. J. P. Hill, our chosen representative in London, so little time to make arrangements for setting aside some important work with which he was engaged when the Society's mandate reached him, that he was quite unable to justify the Society's choice of him, or communicate with it respecting some one to take his place.

To Count Mörner, Consul General for Sweden, in particular, to Professor David Starr Jordan, to the other visitors and to all the Members who were present at or took part in the evening's proceedings the Society is greatly indebted for a pleasurable and profitable evening of an altogether unusual character.

The visit of Dr. Jordan for the purpose of delivering a course of University Extension Lectures was a noteworthy event of last year, and afforded Australian biologists and educationalists an

excellent opportunity for pleasant and profitable intercourse and exchange of experiences. The Great Republic, as befits its magnitude and seniority, has succeeded to a greater extent than we have in emancipating itself from inherited tradition in educational matters, and in working out its own destiny along lines which have been evolved in response to its own special needs. Dr. Jordan is such a capable and brilliant representative and exponent of advanced American thought in higher education and science that his visit must have done much more to stimulate and encourage Australians than it is possible to estimate satisfactorily by mere conjecture. The goal of the Americans is substantially ours, and it has been good for us to be reminded that there are other practicable routes to it besides the one we may have been led to follow; and that a free interchange of thought and experience may be expected to show the way to fresh and higher ideals, as well as to improved methods of work.

In the second of two Presidential Addresses delivered to the Members of this Society in 1894 and 1895, which will well repay your perusal, Professor David summarised what was then known of the Antarctic Continent, and discussed the prospects of further exploration, little imagining that the future had in store for him the opportunity of experiencing the hardships of that inhospitable region, of sojourning for a year in Antarctica, and of establishing scientific relations with the great ice barrier, with Mounts Erebus and Terror, and other features of the great lone land which give it some of its salient characteristics. The lecture which Lieutenant Shackleton, leader of the British Antarctic Expedition, 1907-08, delivered in Sydney on 6th December attracted an audience of phenomenal dimensions, and aroused extraordinary interest, which was greatly intensified by the knowledge that Professor David and some of his pupils were to accompany the expedition during at any rate one stage of its operations. The recollection of the capable and eloquent way in which the lecturer presented and treated the subject of his discourse; and of the truly Davidian fervour which characterised the Professor's reply to the enthusiastic demand of the large

audience for just a few remarks, will be fresh in your minds. The enlightened action of the Federal Government in voting the sum of £5,000 to supplement and complete the necessary outfit and equipment of the expedition led by Lieutenant Shackleton, and the inclusion of Professor David in its personnel as leader of the scientific staff, as well as of other Australian representatives of Science, have given Australia a direct and personal interest in its progress and welfare, as well as in the subject of Antarctic exploration in general, which is altogether unique in character.

It is not necessary for me to attempt to follow the course of events in detail, because the newspapers have given wide publicity to all that there is to be known at present; and Professor David's narrative, up to the time of the departure of the "Nimrod" on the return voyage, is still in course of publication in the leading daily papers. We have all heard with great regret and disappointment that the "Nimrod" had throughout so much more tempestuous and trying a time of it than the "Discovery," under Captain Scott, over very much the same route in January, 1902; and that the leader's plans for seeking winter quarters in King Edward Seventh's Land, and making this portion of the Antarctic Continent his base of operations were frustrated by insuperable obstacles. In another respect, however, the "Nimrod's" adventurous cruise provides no ground for disappointment. The record of the indomitable courage and daring of the officers and crew of both the "Nimrod" and the "Koonya," would have warmly commended itself to Captain Cook; just as the readiness of the passengers, including the scientific staff, to turn to and try to save the Manchurian ponies from being battered to death or drowned in the stalls, or to man the pumps would have evoked as warmly the approval of Sir Joseph Banks. And we may rejoice that the race which used to breed the grand old stamp of voyager ready to venture all in pursuit of geographical and scientific knowledge, still produces worthy modern representatives.

We have now to wait in patience and in faith for the return of the courageous and steadfast wanderers, encouraged by strong hopes of their success in most, if not in all their enterprises. In the meantime we may not forget, even if we cannot lighten, the anxious solicitude of Mrs. David and the wives, other relatives, and friends of the absent explorers and investigators, both in Australia and in the Old Land.

We have to congratulate Professors Hill and Wilson on the publication of their monograph on the development of *Ornithorhynchus* in the Philosophical Transactions of the Royal Society of England.

I believe that we may claim that this Society is doing a very useful, though unostentatious, work for the community. We combine together to carry out the work designed by our liberal-minded and liberal-handed founder, Sir William Macleay, by studying in precision and in detail our rocks, our fauna and our flora, and by publishing the fresh information so obtained in our Proceedings. Each year a volume of some 800 pages, carefully edited and comprehensively indexed, and illustrated by many plates, bears witness to the industry, the enthusiasm and the patience of the Members and of the Secretary. We hold that our highest duty is to pure Science, to extend our knowledge of Nature for its own sake. This object must be the special care of such Societies as ours, for individual effort is unequal to the task, and Governments will be unwilling, for years at least, to undertake it. It is this work that men of science all over the world look to us to perform, and I think we may say that they recognise that the Society is doing this work with credit.

But all Science is liable to have a practical bearing. And our members, in their work published by the Society, and in work done outside it, have shown that they are by no means neglecting the practical needs of the community. During the year Professor David has completed his magnificent Memoir on the Northern Coalfield. Our Macleay Fellow, Mr. Jensen, has single-handed carried out a geological survey of the Warrum-

bungle and Nandewar Mountains. Dr. Petrie, another Fellow, is doing good work in determining the toxic and other substances of interest produced by Australian plants. Mr. Halligan has been instructed by the Government to make a hydrographic survey of the whole of our coast. Mr. Maiden, besides being the Watchdog of the Domain and the Botanic Gardens, is bringing out a richly illustrated "Forest Flora of New South Wales," with a full account of the economy of each tree. The Forestry Commission availed itself largely of Mr. Turner's knowledge of the local distribution of our trees. I may recall to you the very extensive and careful work done by Messrs. Baker and Smith on the essential oils of the Eucalypts and other Australian plants, work which paves the way to an extensive trade with Europe and America. Every year is showing with startling emphasis the need of the exact diagnosis, and of knowledge of the life-histories, of insects, mostly injurious but some useful. We have an active band of workers on insects in the Society, and an immense amount of information is being accumulated. I may mention the names of Messrs. Masters, Meyrick, Sloane, Blackburn, Lea, Froggatt, Turner, Carter and Tillyard. Two illustrated books on Australian Entomology have been published during the year, by Messrs. Froggatt and Rainbow, and another by Messrs. Waterhouse and Lyell, on the Butterflies, is in course of preparation. Mr. Stead is working under the Fisheries Board. Mr. Hedley has published an account of the Ship-worms, *Teredo*, and his extensive researches on the Mollusca in general are sure to possess practical utility. Lastly, we will cite two recondite investigations, those of our Macleay Bacteriologist, Dr. Greig-Smith, on the opsonisation of bacteria; and those of Dr. Chapman, in conjunction with Professor Welsh, on the true nature of precipitin reactions, and their application to Forensic Medicine, in the identification of blood-stains in suspected criminal cases, the recognition of human or other animal remains, and the detection of substitutions and adulterations in food, as well as, in certain cases, in ordinary clinical diagnosis. This partial enumeration shows that the work of our members has a many-sided and far-reaching bearing on the practical concerns of life.

The Relations of Science and Government.

To prevent misconception we will define our terms. By Science we mean the systematic study of natural phenomena and of the orderly sequences of natural events, and the classified and co-ordinated knowledge which is the fruit of this study. By Government we shall understand the organisations which have been created by the public will, or by the public acquiescence, for carrying out by exercise of legislative and executive powers those functions of national importance, which the nation decides to be unsafe or undesirable to intrust to individual or private control.

Since men are units of the order of Nature, subject to her laws and dependent at every turn on the changes which take place in the relations of the other units, it would seem obvious enough that Government in its working should ever have in mind the importance of the conditions imposed upon us by our being and by our environment. If we are to be the lords of creation or Nature, it can only be by mastering Nature. And to master nature we must understand Nature.

As Sir Ray Lankester* has pointed out, there is greater need now than ever before of this knowledge and understanding. While man was in the savage stage a stable equilibrium had practically obtained among existing organisms. Man, by his interference, has upset this equilibrium. He has aggregated and associated abnormally. His needs have multiplied: the luxuries of yesterday are the commonplace necessities of to-day. To meet his new and wilfully induced conditions, and to supply his new and multiplied requirements, he has at first slowly and and slightly but later, and especially in the last century with its marvellous record of discoveries and inventions, rapidly and comprehensively modified the very face of Nature. He has taken charge of the geographical distribution of plants and animals. He is on the verge of taking charge of the distribution of fresh

* "The Kingdom of Man." By E. Ray Lankester, LL.D., F.R.S. London, 1907.

water. He is drawing with a lavish hand on the mighty but still finite stores of energy which he has discovered lying ready in the bowels of the earth, and already sees himself face to face with the necessity of finding means to draw on solar radiation, the interior heat of the globe, and tidal energy. Incidentally by disturbing the balance of Nature he has introduced foes into his own household, and among the organisms which he has taken under his protection. By nursing his sick and cherishing his weak, he has unwittingly fostered an army of diseases, and by the greatly increased facility in transit and transport he has spread them far and wide. And in the same way he has introduced and maintained diseases amongst his domestic animals, and pests amongst his domestic plants.

In consequence of these and other extraordinary displacements of the ordinary arrangements of Nature which had become established by immemorial usage, man, as the disturbing body, arouses the resistance of all bodies disturbed. He can only maintain his position by the exercise of tremendous energy, and by a precise and extended knowledge of the stresses to which he has exposed himself. Using a different metaphor, Lankester styles him Nature's Insurgent Son. Pursuing this conception, he shows that, having advanced so far into the provinces of Nature, man must fortify the position he has won, and must advance still further until he has the keys of the kingdom in his possession. To hold his own, and to advance further, he must learn well the nature of the country, and the resources and disposition of the opposing forces. This knowledge he can only obtain from his scouts and pioneers—the workers in Science.

That this essential fact is not sufficiently recognised either by the public or by politicians is only too manifest. How far can our legislative bodies claim to be qualified by a scientific knowledge of the material resources of the State, and of the laws under which they may be utilised and developed and conserved in the interests of the State as a whole regarded as a permanent institution, an enduring nation? They have to consider in a minor degree the scientific development of manufactures, but far

more urgent is the case of the land and its products, for it is on these that Australia must ultimately depend. Hence urgent need for knowledge of the multifarious and peculiar climatic conditions, of the natural economy of our soils, of our waters, of our forests, of our birds and of our insects. Do the members of the Legislatures possess this knowledge, or are they able to obtain the knowledge from a sufficient number of experts within or without the Public Service, and are they willing to weigh with care the dispassionate advice of the experts? Our members are chosen because of their knowledge of men, not forgetting their weaknesses, their knowledge of law and of the workings of the political machine, and their knowledge of business, but not because of their knowledge of Nature. The few medical men elected are almost the only members with a scientific training. I think, in our own State at all events, there is a growing willingness to acquire exact information by the appointment of Commissioners including scientific experts, but how often in the past the reports of skilled officers and the findings of Commissions have been neglected or ignored! On the Executive side what an army of clerks there is in comparison with the few scientific experts, and how often these are looked upon askance and with suspicion as idealists and faddists, who bring forward awkward objections to cut and dried schemes which the will of the Minister or the exigencies of party have decided must go through.

The public is generally not sufficiently educated to realise the importance of scientific knowledge in the Government. Yet it is the public which pays for the mistakes of the Government. And it is the public upon whose behalf the expert speaks. It was the science of the skilled expert which stayed the plague and checked diphtheria. It is the science of the skilled expert which has reduced, and only can reduce, the scourge of typhoid. It is only by the science of the expert that we can hope to be able to exterminate those curses of our civilisation, phthisis and cancer and syphilis, and, I think I may add, that greater curse still, the craving for strong drink. It is only science that can teach us how

to deal with our droughts, how to profitably cultivate our lands without impoverishing or exhausting them, how to maintain and improve our stock, how best to draw on our mineral supplies, how to most efficiently and most economically work up our raw materials into manufactured products. Every commercial interest in the State, every individual, is most deeply interested in the manner in which our country is handled by Government. John Smithson, who provided America with the incentive and the means to found the magnificent Smithsonian Institution, declared his strong conviction "that it is in his *knowledge* that Man has found his greatness, . . . and consequently that no ignorance is probably without loss to him, no error without evil."

How much have Australians had to pay for the ignorance of of one of the Legislatures of the habits and propagating powers of the common rabbit? We learn that over 20,000 foxes were destroyed in Victoria last year. It is the Victorian farmers who now pay most heavily for the wicked ignorance which allowed of the introduction of this vermin. In a few years it will be the farmers of New South Wales and South Australia. How light-heartedly the sparrow was admitted to the rights of Australian citizenship, just owing to ignorance of the generic distinction between *Passer* and *Accentor*! How much money is needed for the eradication of Bathurst Burr, Prickly Pear, Water Hyacinth, Bramble and Sweetbriar, Codlin Moth, Waxy Scale, Pear Slug, and Red Spider, owing to carelessness or lack of knowledge in the early days? How France paid for the careless introduction of Phylloxera into her vineyards, and Ireland suffered for admitting the Colorado Beetle among her potatoes! Fortunately these costly lessons have not been lost upon the Legislatures of the present, and watch is kept at our gates against the admission of such undesirable immigrants, whether they threaten our pastures, our poultry, or our fruit. By such heavy punitive payments Government, Newspapers and People are learning by degrees that ignorance of Nature is costly. It is an easy corollary that to avoid such penalties in the future we need to multiply, to train, to employ and to trust the scientific worker.

There are signs here and elsewhere that responsible Ministers are recognising that skilled knowledge must play a larger and larger part in the administration of public affairs. Mr. R. B. Haldane, the British Secretary for War, speaking at Liverpool last September, said—"The creation of the Committee of National Defence carried scientific principles into the sphere of government, and was the first step towards getting military and naval notions into order. We have now a general staff which is a body, not to exercise command, but to give advice in a thoroughly practical fashion and in a fashion which can be enforced. The speculation may be indulged in whether one of the great reforms of government to which we are coming—because we have been driven to it—will not be the creation in an organised fashion of just such a general staff for departments of government, and not merely for the army." He goes on to give "a concrete instance of the value of scientific advice."

Our own Premier, Mr. C. G. Wade, speaking recently at Newcastle of the failure of the Arbitration Court, outlined the proposal of a new tribunal "which is not to leave to the mercy of one Court in the State the problem of dealing with all its industrial troubles, that Court composed of men who have no special knowledge in the industry concerned. The tribunal which must deal with these disputes is one to be presided over by men engaged in the particular industry concerned, men who have been experienced and trained in such industry." This is a wise and clear statement of a general principle which if applied to problems which involve special knowledge of natural science will give science workers all that they can reasonably ask. The practical man with practical interests and the man with the requisite technical knowledge could then work hand in hand for the common good.

To again quote Mr. Haldane. "If people were but aware what can be accomplished and what can be saved to the State, and the extent to which our community can be made more efficient by dealing with these things on a scientific footing, the nation would be wiser and better. This may seem to be the

bureaucratic point of view, but when it is founded on science it is the right point of view; and the governments of the future will find more and more work of this kind forced upon them."

We have other practical evidences of an awakening to the recognition of the importance of scientific knowledge and scientific method, which it would be ungrateful and unfair not to cordially recognise. Mr. S. W. Moore, while Secretary for Mines and Agriculture, convened a Conference of the Government Entomologists of the five Eastern States to discuss the advisability of common action, and the best measures for dealing with our numerous insect pests; and when the Conference declared that "It is desirable that a Government Entomologist should be sent to California to investigate internal parasites, especially those of the codling moth," the various Governments combined to send our Mr. Froggatt, unanimously elected by his colleagues, on a wide commission to hunt the world over for parasites to attack the insect pests, especially the fruit flies (*Ceratitis*, *Tephritis*, and *Trypeta*), and to defray all the expenses.

Again, the Government has authorised a grant of £18,000 for the extension of the South Wing of the Australian Museum, consisting of a basement and two galleries. The basement will be employed to provide additional workshops and an up-to-date crematorium for rejectamenta. The first floor will continue the extensive mammalian and osteological collections. The second floor will be devoted to Man and his work. Further we are glad to record that in 1907 the Trustees were enabled to obtain an increased money grant from the Treasury, so that they were able to give a substantial increase of salary to everyone engaged in the Museum.

Let us now consider more in detail some of the fields in which scientific knowledge intimately concerns the administration of our country.

Weather.—The great factors which determine our climate, the presence of the cold Antarctic to the South, our situation in the High Pressure belt in the course of the procession of Anti-cyclones, and in the North in the Trade Wind track, and the

contours of our Continent, are beyond our control, but they ought not to be beyond our knowledge. The climate has its peculiarities, some highly favourable, others sufficiently trying, but the only way to make the best of it is to understand it, and to regulate our action in accordance with our understanding. Hitherto the separate States have with varying degrees of attention created, administered, or neglected their Weather Bureaus. The Commonwealth Government has now, however, taken over the whole Department. This in itself is a vast improvement. The climate of Australia can only be studied scientifically as a whole, and one organisation can compass the work much more efficiently than half a dozen independent bodies. Another most hopeful feature is that last winter on the direct invitation of the Minister for Home Affairs a Conference of scientific men, including Professors from the Universities of Sydney, Melbourne, and Adelaide, and presided over by the Commonwealth Meteorologist, Mr. Hunt, was held for the purpose of securing uniformity in meteorological methods throughout Australia, and with a view to ascertaining the best methods of obtaining the most efficient services. All the States were represented with the not very creditable exception of Queensland. The subjects discussed were :—

(1) The range of practical meteorological observation to be at once undertaken.

(2) The expansion of meteorological work to be undertaken in the future.

(3) The extent of purely scientific investigations, the undertaking of which is desirable in the interests of meteorology.

(4) Meteorological records, reports, and publications.

(5) Maritime meteorology.

(6) The relation of river observation to flood forecasting.

(7) The co-operation of the Commonwealth and States Departments.

These form a comprehensive programme, and the recommendations brought forward showed the value of the happy combination of skilled officials and representatives of pure science. Of the

broad view taken we can judge by the first sentence of the sub-committee's report: "It is of the first order of importance that the work of the Meteorological Bureau should not be confined to the accumulation of facts on stereotyped or traditional lines, but should be strengthened and unified by the inclusion of original research." The wisdom of the Federal Government in summoning the Conference to advise leads us to expect that as far, and as soon, as possible the advice will be followed. Another strong evidence of the disposition of the Government was furnished by the handsome contribution of £5,000 made by it to the present Expedition, which has for one of its objects the investigation of the conditions of Antarctic weather. As seen above, Maritime Meteorology was one of the subjects discussed at the Conference, and it was suggested that a branch be established in the Bureau for collecting data of atmospheric phenomena and of temperatures and currents of the seas which lie to East and West and South of us, presumably not omitting the region of "the Roaring Forties and Shrieking Fifties," as Professor David calls them, writing feelingly from Lat. 61° S. No doubt too one of the bits of work to be undertaken by the Bureau will be the testing of the attractive but alas, evasive theories of the recapitulation of climatic conditions in cycles.

Minerals.—Generally speaking we must look upon our mineral resources as pure capital. Doubtless the natural agencies which have produced our auriferous reefs and our mineral veins are still in operation, but the time required for reproduction is beyond the time-limit of man. We do not know that anywhere in the world, we do know that nowhere in Australia, are the processes going on which would produce new coal seams. Practically every ounce of gold and every ton of coal we draw from the earth is withdrawn from it finally and leaves us the poorer. The supplies though bountiful are after all finite, and some day there will be an end. Hence it is plain that the land itself is our most important, as our most abiding, possession. That we should use this other lavishly furnished capital to the best advantage is also plain. The most scientific

methods of extraction and of treatment should be practised. How far do—can—our Schools of Mines experiment with refractory ores? The policy of our Australian Governments has been to give up the whole of our mineral resources to private exploitation. This is not the place to discuss or criticise this policy. But the scientific man may consider its bearing on the development of the country, which we have seen must be eventually the development of the land-industries. Looking upon our minerals as a generous capital, we may ask, is it being expended, as would seem natural, in the development of the country? It may be replied that we have used it to attract population, to establish manufactures, to help to support our railway systems, to build mining towns and communications with them, to pay wages to a large army of miners, and indirectly to necessitate a great production of animal and vegetable food for the sustenance of the large numbers concerned in the mining industries. Perhaps this reply is sufficient. Will it be eventually considered sufficient? We must content ouselves here with having put the question.

Water.—There is one substance which the geologist classifies as a mineral, however, which is on a different footing. That is water. Our climatic conditions being mainly regulated by large world-conditions we may look upon our rainfall as practically constant for a certain cycle of years, though it may be, in accordance with some general law, slowly decreasing. Our fresh water then, unlike our coal, is perennially renewed, whether it be dispersed in the soil and rocks or collected in our rivers or our artesian supplies. We need it for our towns and cities, and for natural or artificial irrigation of our soils. In New South Wales its uses for navigation purposes are very limited. Australia is not a land of canals. But what a prodigious problem we are confronted with: How to procure and to maintain a permanent supply of water for our rapidly increasing towns, and for our as rapidly increasing agricultural and pastoral industries?

The metropolitan water supply has been recently a scalding, if it is too Irish to call it a burning, question. It may perhaps be useful to glance at the views forced upon the British Govern-

ment and the London and other British Water Boards by the press of population in the Old Country. The average daily supply to London has increased from 144 million gallons in 1881 to 225 millions in 1906-7, the amount consumed per head being 33 gallons in each year. In 1960, at 35 gallons per head, the Metropolitan Water Board estimates the demand at 420 millions. By the construction of immense storage reservoirs, and elaborate connections, the chief engineer believes that it will be possible to obtain a supply of 450 million gallons from the Thames, but that this is the absolute limit. It is thus plain that London will have to draw water by an heroic scheme from a distant source, probably the mountains of Wales, and that within the lifetime of a number of the existing population. And the other cities of Great Britain have to face correspondingly heavy expenditures. And here comes in the further difficulty that several of these have their eye on the same sources. Hence the Water Board has adopted this resolution : "That as the increase of population will eventually render resort to some other source than the Thames watershed imperative, the Board view with great alarm the increasing tendency of authorities throughout the kingdom to appropriate water-supplying areas for their particular use, and in these circumstances desire to urge upon Parliament the necessity for regulating the appropriation of water-supplying areas, so that the needs of the metropolis as well as of other populous places may receive due consideration." In England, then, they are, of compulsion, looking ahead half a century in making arrangements for the metropolitan water-supply.

With this example before us, it would seem to be an evidently wise policy to make sure betimes of the most extensive catchment areas for the ever expansive water supply needed for the metropolis, for Newcastle, Bathurst, and the other large towns. Though our numbers do not compare with those of the British cities, our need for water per head is greater, for our gardens and parks, and for our growing manufactures, while the loss by evaporation is far greater than anything known in Great Britain. There is need to keep watch on these catchment areas,

to see that the tree-growth is not removed from the sources of the contributing streams, and to prevent contamination of the water by the establishment in the area of vested and injurious interests. In the particular case of the metropolis now under discussion, two eminently scientific objectives have come into collision. It is urgent to establish effective Consumptive Homes, and it is urgent to secure a high-level water source in order that pressure of water sufficient to cope with city fires may be obtained by gravitation only, and to secure as large a catchment area as we can in face of the great needs of the future. We have every reason to credit the present Government with perfectly disinterested motives in their decision, but we cannot but think that the larger need should take precedence of the smaller. And I feel sure that the sympathy of every man of science will be with Mr. Keele, who has so bravely and so persistently fought for the needs of his department, of which he has the expert knowledge which no one else can possess so fully. And it would be a disgrace to the country if faithful and courageous expression of the views which he knows and can show to be scientifically just and correct should redound to the hurt of any scientific officer of the State.

The even larger question of the provision of water for irrigation purposes demands also a wide and early grasp of the possibilities of supply. The Minister for Works, Mr. Lee, is an enthusiast in the matter. He may well be proud of the Barren Jack scheme, and he has recently expressed his wish to provide a great extension of irrigation to the Nepean country, and incidentally regretted "my limited staff of engineers for the purposes of investigation."

In truth we need a comprehensive investigation of the catchment areas of the different river-basins of the State, and also of the possibilities of artesian water-supply. That these last are great is known, the present artesian water supply being many times greater than that of Cataract Gorge and Prospect Reservoir combined. But there has been no systematic investigation of the water-bearing zones, of their extent and capacity, of the

intake beds, of the real causes of supply, of the fluctuations in output, of the interdependence of the bores. For full efficiency, for us to get the most out of this invaluable asset of our interior, casual trials here and there where water is wanted are inadequate; the system must be considered as a whole, and then only can we have a fair and wise general organisation and control.

The Land.—That the Press is realising the importance of the cultivation of the land is plain by the large amount of space given up to the subject in the daily papers. To quote the *Sydney Morning Herald* of Feb. 15th, 1908, "Our duty to primary production is clear. Whatever else we may neglect we should make this our especial care." Advocating the establishment of a Federal Department of Agriculture, the *Herald* goes on to say "The Commonwealth's model in this respect may well be the United States Department of Agriculture. It has taken shape under conditions similar to ours, and it stands to-day the finest State organisation of the kind in the world." Everybody who has studied the methods and the publications of this grand Department will heartily endorse the encomium. Armies of experts are employed in the Laboratories and in the Experimental Stations. Every problem which confronts the farmers is attacked with adequate means, and with a full determination to obtain the best possible solution. By no means content with a knowledge of what is being done in the States and Territories, the Department makes itself acquainted with the organisation and progress of similar institutions in foreign countries. [In a special Bulletin published in 1905 and giving information on the important subject of Agricultural Instruction for adults in the British Empire, it is somewhat galling to find 12 pages given to Australia and over 40 to Canada, and especially to find New South Wales dismissed with the single sentence "Nothing corresponding to the farmers' institute system of the United States is in operation in New South Wales."] For a cardinal principle with the Department is that the knowledge wrested from Nature shall be brought home to the men who are actually conducting the operations on the soil. This is accomplished by

the free and profuse distribution of Bulletins bearing on every side of farm life, written in exact but simple language, by the employment of itinerant instructors, and especially by encouraging the farmers to form Farmers' Institutes. These last are associations or clubs for discussion of common difficulties and interchange of opinions, organised under the auspices of the Department so as to effectively disseminate "the results of the work of the Department of Agriculture and the Agricultural Experiment Stations and of improved methods of agricultural practice." Thus the Department tries to reach the farmer's son and the farmer's daughter as well as the farmer himself. For the Department recognises that general improvement in cultivation can only be secured by the willing and intelligent co-operation of the agricultural population. And it therefore sets itself the task to prove to the cultivators that it is worth their while, in pounds, shillings and pence, or perhaps in dollars, to follow the scientific advice which is brought to their doors. Our State Department of Agriculture is being re-organised, and a Federal Department is likely to be established, and we may hope, with the *Herald*, that the experience of America will be largely utilised in the new developments.

This Department strikes admiration into everyone who sees its working. Its Experimental Stations are numbered in scores, and the Farmers' Clubs in hundreds. These latter are established in every State and Territory except ice-bound Alaska. Prof. H. E. Armstrong, of the Moseley Commission, says of the Central Department of Washington that it is "not merely an office—it is also a busy hive of research." "In 1902 the staff numbered 3,789, of whom 1,209 were executive officers, clerks and messengers, 2,081 scientific investigators, and 409 labourers." I would call attention to the proportion of scientific investigators. Why they outnumber clerks and labourers combined. In Australia heads of departments can usually obtain as many clerks as they ask for, and always as many pick and shovel men as can be crowded on the place, while scientific appointments are too often grudgingly made, temporary in tenure, and badly paid. The Ameri-

cans have found that genuine scientific servants are the hub of the whole concern. May our re-organised Department of Agricultnre find the same.

A happy feature of the American organisation is the holding of Conventions of delegates from the Agricultural Colleges and Experiment Stations of the whole Union in which technical and general questions are discussed. Recommendations from such bodies of experts in theory and practice carry with them a weight which it is difficult for officialism or political interest to resist.

The fine spirit which animates the central government is well shown in an Address by President Roosevelt at the Jubilee celebration of the Founding of Agricultural Colleges of the United States, held at Lansing, Mich., last year. May I quote some of his sayings? "We of the United States must develop a system under which each individual citizen shall be trained so as to be effective individually as an economic unit, and fit to be organised with his fellows so that he and they can work in efficient fashion together." "The question is vital to our future progress, and public attention should be focussed upon it." "The calling of the skilled tiller of the soil, the calling of the skilled mechanic, should alike be recognised as professions, just as emphatically as the callings of lawyer, of doctor, of banker, merchant, or clerk. . . . They should be trained alike in head and in hand. They should get over the idea that to earn 12 dollars a week and call it 'salary' is better than to earn 25 dollars a week and call it 'wages.'" "In every great crisis of the past a peculiar dependence has had to be placed upon the farming population, and this dependence has hitherto been justified. But it can not be justified in the future if agriculture is permitted to sink in the scale as compared with other employments. We can not afford to lose that pre-eminently typical American, the farmer who owns his own farm." "The prime need must always be for real research, resulting in scientific conclusions of proved soundness." "Hereafter another great task before the National Department of Agriculture must be to

foster agriculture for its social results, or, in other words, to assist in bringing about the best kind of life on the farm for the sake of producing the best kind of men." "Farmers must learn the vital need of co-operation with one another." "The farmers in the region affected by the boll-weevil, in the course of the efforts to fight it, have succeeded in developing a most scientific husbandry, so that in many places the boll-weevil became a blessing in disguise. Not only did the industry of farming become of very much greater economic value in its direct results, but it became immensely more interesting to thousands of families." "It is only through such combination that American farmers can develop to the full their economic and social power. Combination of this sort has, in Denmark, for instance, resulted in bringing the people back to the land, and has enabled the Danish peasant to compete in extraordinary fashion, not only at home but in foreign countries, with all rivals."

Again the President speaks out in his opening Address to the American Forest Congress, held at Washington, January, 1905. "All of you know that there is opportunity in any new country for the development of the type of temporary inhabitant whose idea is to skin the country and go somewhere else. You all know, and especially those of you from the West, the individual whose idea of developing the country is to cut every stick of timber off of it, and then leave a barren desert for the home-maker who comes in after him. That man is a curse and not a blessing to the country. The prop of the country must be the business man who intends so to run his business that it will be profitable to his children after him. That is the type of business that it is worth while to develop." "I ask, with all the intensity that I am capable of, that the men of the West will remember the sharp distinction I have just drawn between the man who skins the land and the man who develops the country. *I am going to work with, and only with, the man who develops the country. I am against the land-skinner every time.*" And so, gentlemen, I think, say all of us. We are against the forest skinner and against the man who grazes out the saltbushes.

Forests.—The address of President Roosevelt was, as we have said, delivered at the National Congress of 1905, held to consider the great subject of Forest Reservation and National Prosperity. At this Congress "practical methods of safeguarding the broad business interests of the nation, now threatened by wholesale forest destruction, were considered by lumbermen, railroad men, engineers, foresters, and representatives of the mining, grazing, cooperage, and other interests, of the several States and of the National Government." The President of the United States himself delivered the opening address.

Australia, and New South Wales in particular, has been lavishly endowed by nature with forests of the most valuable timbers in the world. These have been handed down to us intact by the simple-minded Aborigines. It has been reserved for the white man to set about skinning the country. Our immensely valuable forests have been recklessly devastated by fire and axe, by men regardless of all but immediate and personal returns, until the very existence of some of the most important timbers is threatened. The timber wasted has been infinitely greater than the timber used. The forests have been destroyed, not reaped. Here, again, the Government is confronted with a tremendous problem—How to maintain and supervise our forests, so that we may have a perennial supply of timber for all our own increasing needs and for export to less favoured countries, and that the forests themselves may remain efficient to perform the important functions which it is their business to perform in the general economy of nature. It is no mere sentiment, the desire to preserve things beautiful, though there is no sin in that, but the absolutely material necessities of every commercial and industrial class, of every individual in the Commonwealth, which compel us to urge upon the Government the scientific supervision and care of our forests. We need living trees and much wood, and our children's children will need them no less than we. What are we going to do in order to make sure that those needs shall be abundantly satisfied ?

The Americans have been as careless over their forests as the Australians. They have experimented in destruction on the same large scale, and from the views expressed in the Forest Congress we can learn large lessons from their experience.

First as to the connection of the forests with natural and artificial irrigation. Probably the total amount of rainfall in Australia is determined by other factors. But the distribution of that rainfall, its retention in the soil, is mainly determined by the existence of forests. The Hon. James Wilson, Secretary for Agriculture, said : "Forestry and irrigation go hand in hand in the agricultural development of the West. The West must have water, and that in a sure and permanent supply. Unless we practise forestry in the mountain forests of the West, the expenditure under the national irrigation law will be fruitless, and the wise policy of the Government in the agricultural development of the arid regions will utterly fail. The relations in the arid regions between the area under forest and the area in farms will always be constant. We can maintain the present water supply of the West by the protection of existing forests. In exactly the same way we can increase this supply by the foresting of denuded watersheds. The full development of the irrigation policy requires more than the protection of existing forests—it demands their extension also." Surely this shows to us the wisdom of maintaining our forests about the heads of the eastern rivers for the sake of agriculture in the valley flats, and the possibility of increasing the irrigation of the great plains by afforesting the western slopes of the Divide around the heads of the tributaries of the Darling.

Again, the Hon. John F. Lacey, Representative in Congress from Iowa, said : "I was born in the woods of Virginia. I moved to the prairies, and one of the most unpleasant things of my subsequent life was to return to the woods of Virginia and find that the old streams and the holes we used to swim in and where we used to go fishing are now gravelly roads. They are highways as dry, as arid, as one of the deserts of Arizona or New Mexico. Why is it? Because the trees have been cut

down, and the springs, the children of the forest, dried up. Instead of a slow-running brook digging out holes here and there clear as crystal, we have simply a torrent carrying the pebbles and sand from the hills, and then a desert."

The Ambassador of France to the United States stated that "in France our forests, like all the other inhabitants of the land, have their own code of laws. One of them is the law of 1860, which provides that every landowner who possesses mountain slopes is obliged, whether he wills or not, to re-forest them if denuded. In 1882 a new law, perhaps a little less stringent, but more practical, was enacted. According to this law, which is still in force, the Government has the right to serve an injunction on any owner of mountains who has not re-forested them. The owner has a right to refuse, and in that case the Government expends a fair sum of money and plants the trees for the good of the community. The results have been very happy. In every part where these rules have been applied it is noted that the temperature is more equal, that the water supplies from springs have been more regular, and the torrents less destructive." If in France, where the climate is temperate, where the lower vegetation is more continuous, and the ground is not baked brick hard by a fierce sun, it is considered of national importance to preserve the forests of the highlands by such stringent laws, it is surely a lesson to us with our generally more arid conditions, our bright sunshine and our exceptional monsoonal rains.

The importance of forests in the upper reaches in preventing disastrous floods in the lower reaches of the rivers has been demonstrated abundantly in the States. Mr. Wilson says: "We have to tell the people of the lower Mississippi every few years to raise their levees to hold the floods that exceed themselves, as the forest ceases to hold waters that in previous years were directed into the hills and held back." Sydney, of course, is in no danger of serious floods, but Newcastle, Maitland, Grafton and the other towns similarly situated are strongly interested in the preservation of the forests in the catchment areas of these rivers.

Another practical lesson in the economy of the forest may be learnt from American experience. President Roosevelt said: "Those of us who have lived on the Great Plains, who are acquainted with the conditions in parts of Oklahoma, Nebraska, Kansas, and the Dakotas, know that wood forms an immensely portentous element in helping the farmer on those plains to battle against his worst enemy—wind. The use of forests as wind-breaks out on these plains, where the tree does not grow unless man helps it, is of enormous importance." We have evidence of this truth in our own Blue Mountains, where the cutting down of the trees and the uncontrolled bush fires are not only making the water supply for the local towns precarious, but allow the strong westerlies to sweep away the soil and expose the bare rock. The Blue Mountains will never be an agricultural paradise, but must depend on those who visit them for the sake of health and recreation. Here a timely planting of trees around the water-courses is probably the only means of preserving the beauty and the utility of these charming health resorts.

The use of wood is rapidly increasing all over the world, and timber is steadily growing in value. That means the rapidly increasing commercial value of our forests. Wood is consumed locally in a thousand ways, for fuel and fencing, for the construction of all buildings, for railway sleepers and telegraph poles, for the mines, for street paving, for the making of barrels and boxes and cases used in the transport of every kind of merchandise. The greater our population, the more extensive our mining and manufacturing enterprises, the more timber we shall need. What a complete disorganisation of commerce would be brought about by a Wood Famine! The oldest necessities of mankind were food, water and wood, and these will be prime necessities to the end of time. It is everybody's interest to see that we secure betimes an ample local supply for local needs, and a supply for export on what must be ever more remunerative terms. The Government then, acting on behalf of the whole community, must see to it that our forests are not skinned and destroyed, but that they be maintained in full efficiency and widely

extended. We need a strong Forestry Department, whose skilled officers shall be listened to, and their recommendations carried out. Money spent, freely spent, on the conservation of our forests, will be money well invested.

Fauna.—The Australian native Fauna is largely unique, and is remarkable for the comparatively small number of destructive vertebrates which, from man's point of view, may be looked upon as pests. The serious enemies to man are the insects, locusts, grasshoppers, caterpillars, beetles and the small fry that destroy the trees, shrubs and herbs. The Marsupials are mostly fur-bearing animals, and their pelts are likely to become increasingly valuable in the markets of the world. Every year millions of Opossum skins and hundreds of thousands of Macropus skins are exported to the Old World at good prices. The farmer and the farmer's wife, the farmer's sons and the farmer's daughters, make pin money by skinning the opossums, literally and in President Roosevelt's sense. These animals are necessarily becoming greatly reduced in numbers, and in many districts are practically exterminated. The Kangaroos and Wallabies are shot for sport, for their pelts, for their soup-making tails, or because they are rivals of the sheep and cattle. Is Australia prepared to lose altogether its fur-bearing Marsupials? I have inquired at times amongst practical men, and find that at present prices it is much more profitable on fairly good land to rear sheep and cattle than to rear Kangaroos and Wallabies. In poor country, rocky and hilly, the comparison is not so unfavourable to the latter. The feasible policy then seems to be to protect the Marsupials to such an extent as to prevent extermination on the good grounds, to give them a good chance in poor country, and to set aside areas, the Government on a larger scale as in national parks and reserves, and broad minded landowners, as some are doing, on a smaller scale, in which a stock of Marsupials may be preserved. Then, when prices are favourable, it will be at least possible to develop on a feasible scale a fur industry which may compare with the ostrich farming which has been found so profitable in Cape Colony.

The Act at present in force in New South Wales, assented to in 1903, prescribes a close season from August 1st to January 31st of each year for the Red Kangaroo and the Wallaroo, our friend the Native Bear, the Wombats and Flying Phalangers, and for the Platypus and the Echidna. This is a welcome step in the right direction, and we trust that the list will be extended to include the other fur-bearing Marsupials.

Fish.—The Fisheries Board is doing excellent work in the protection and the introduction of edible fish, both in our fresh waters and in the shore waters of the ocean. We would like to see its hands strengthened, and its operations extended to the deeper waters. This part of our natural food-supply is of vast importance to the community, and we know but too little at present as to the habits and migrations of our sea fish.

Birds.—It is hard to speak in terms of calm moderation on the subject of the Protection of our Native Birds. Enthusiasm is liable to be looked upon with suspicion. But the point is that everyone who studies the useful work done by our beautiful feathered friends inevitably becomes an enthusiast for their protection. Great credit is due to the members of the Australasian Ornithologists' Union, to Colonel Legge, Colonel Ryan, Mr. Dudley Le Souef, Mr. A. J. Campbell, Mr. Mattingley, and the rest for their persistent endeavours to bring the importance of the work done by the birds home to the Governments and people of the Commonwealth. To quote Mr. Campbell, "Apart from the physical elements, the most important allies of the farmer, pastoralist or orchardist, are our beloved birds—not to mention the delight that many of them give us in form, colour and song. Australian producers appear slow to recognise the great utility of birds, because their (the birds') work is mostly unobserved. The diet of numerous birds consists mainly of the lower forms of life—insects and such-like crawling creatures. Experts who have studied the question know how the lowly hordes of insect pests increase, often at an astounding rate, and what a destructive power they are to almost every living green thing. Happily this insect life is kept in check by birds. Contemplate what

would become of the forest and field—the pastures of man and beast—were there no birds? The land would in time become a wilderness. In endeavouring to combat the attacks or increase of insect pests there is no "insecticide" so cheap or so effective as the original and natural one—birds."

We may recall the old picture of desolation presented by the Hebrew prophet Joel. "That which the palmer worm hath left hath the locust eaten; and that which the locust hath left hath the cankerworm eaten; and that which the cankerworm hath left hath the caterpillar eaten." But wheresoever the grasshoppers and the caterpillars be there will the insectivorous birds be gathered together. Recently in Victoria there was an interruption on one of the telegraph lines. The officers sent to discover the cause found the upper wire brought down into contact with the lower by the weight, the papers say, of thousands of crows. There was a grasshopper plague in the district, and the crows, usually only seen in pairs, had assembled from miles around, had caroused on the pest, and were reposing on the upper wires, which their weight, assisted by that of the grasshoppers, brought into contact with the lower. And, strange to say, in this case the attacking allies of man were from the tribe of the much-abused crow.

An army of insectivorous birds works to keep our orchards clean, and among the fruit-growers this is so well recognised that the birds are looked upon as friends of all except by the cat, the schoolboy—and the collector. The Bustards do their best with the grasshopper, devouring them until the birds are so heavy they can be knocked over with a stick. And white men will do it. The Herons and Egrets and Ibis "police the irrigation channels," seeking out the "yabbie" crayfish, which have done so much damage by drilling holes through the retaining banks at Mildura and elsewhere. These birds and others destroy the molluscs on the wet flats which serve as hosts to the liver-fluke so deadly to the sheep. But instances might be multiplied indefinitely.

Colonel Ryan and Mr. Campbell have in successive addresses to the Ornithologists' Union shown what measures have been

adopted in America and Europe for the protection of birds. The Lacey Act, approved by the American Congress in 1900, the broadest and most comprehensive measure ever introduced for the protection of wild birds and animals, contains three main divisions :—

(1) It places the preservation of birds under the jurisdiction of the Department of Agriculture.

(2) Authorises the Secretary for Agriculture to regulate the importation of foreign birds and animals.

(3) Prohibits interstate traffic in birds killed in violation of State laws.

The results have been effective protection of native game birds, the importation of new game birds, the establishment of national reserves for the protection of birds and animals, and the creation among the people of a strong sentiment in favour of the wise preservation of the avifauna.

To what extent importance is attached to bird protection in Europe is seen from the fact that the great countries of the Continent have combined to adopt international legislation on the subject. Mainly through the efforts of the Austrian and Hungarian Governments, all of the Continental nations, except Italy, Russia and Turkey, in 1902, accepted through their plenipotentiaries a model bird bill to be incorporated in the laws of the several countries. The necessity for common action arises because the land-frontiers of the countries are no barriers for the birds. For the same reason it is eminently desirable that the whole of the Australian State Governments should adopt the same legislation in the matter. It is obviously more effective to protect the birds in all the States than in a few, and it is eminently desirable that destroyers of protected birds in one State should find no refuge against prosecution in an adjoining one. They have found this out in Europe; they have found this out in the United States. We may well follow suit in Australia.

Difficulties in administration in Russia and in Turkey may explain the non-inclusion of those countries. That Italy, the land traversed twice a year by hosts of migrating birds, should

have remained outside the union is a matter of great regret. The rulers of the country were in favour of the Bill, but found themselves unable to enforce it among their people—one blushes to write it—"owing to the incurable passion of the Italians for 'robins on toast.'" Fortunately Australians have not developed any such tastes, and the Skylarks, the Robins, the Blue Wrens and the Flycatchers and our other small birds are in no danger of being netted in hundreds for the domestic pot.

The Act adopted in Europe is thorough-going. Article 2 enacts that it shall be forbidden, at any season and in any manner whatsoever, to steal eggs and nests, to take or destroy nestlings. The import of these nests, eggs and nestlings, their transport, the colportage of the same, their putting up to sale, sale and purchase shall be prohibited.

Article 3. The construction and employment of traps, cages, nets, nooses, lime-twigs, or any other kind of instruments used for the purpose of rendering easy the wholesale capture or destruction of birds shall be forbidden.

There are of course reasonable exceptions made to these sweeping regulations, but the point is that the Governments do not publish lists of a few birds to be protected, but publish the exceptions, and the conditions under which they may be taken or destroyed.

In contrast to this European example, in Australia the several States have independent Acts, more or less incomprehensive, and have no regulations for inter-State action. The list of protected birds in our New South Wales Act of 1901 is a strange jumble in which the Seagulls, singled out alone from the sea birds, find themselves sandwiched in between the Emu and the Brush Turkey, "Seagulls of every description" (there are only two species to be found all round the coasts of Australia), in which the Butcher Bird lies down by the Coachwhip, in which the 21 genera and 88 species of Honey Eaters are represented only by "the Honey Sucker, *Meliornis*," in which *Gerygone* and *Rhipidura* and most of the technical Fly-Catchers find no place at all. It may not be necessary to go so far as the

Swiss, who absolutely forbade the destruction of any wild birds at all, but we should protect all birds, *except those known to be injurious*, and schedule these, taking it for granted that all not excepted are being protected for the good of the community.

It is generally best to obtain one's ends by persuasion rather than by compulsion, and while it may be necessary to restrain the larrikins of the town, it is eminently desirable that the rural population should have the facts brought home to them, and should heartily co-operate with the Government in a work which so nearly concerns themselves. The larger useful birds of the interior are being destroyed wholesale by the poison laid for pests, and the country thus denuded of its native police is being opened up for the awful plagues of caterpillar and locust. We must try and win the farmer and his household, the squatter and his riders, to the side of their truest friends and best allies, the birds.

The adoption of an Arbor and Bird Day in the country schools has met with success in the United States, and is well worth a trial here. For the sake of the land we love we need to train the children to love the tree and the bird. To quote the Secretary for Agriculture, Mr. Sterling Morton (1904), "Public sentiment, if properly fostered in the schools, would gain force with the growth and development of our boys and girls, and would become a hundredfold more potent than any law enacted by the State or Congress. I believe such a sentiment can be developed, so strong and so universal that a respectable woman will be ashamed to be seen with the wing of a wild bird on her bonnet, and an honest boy will be ashamed to own that he ever robbed a nest or wantonly took the life of a bird." So may it be.

Conclusion.—The Government is the representative of the State, the guardian of the people's heritage. The individual is too apt to consider his private and immediate gain. The Government alone can watch over the permanent interests of the State, can see to it in good time that our resources are not impoverished, that the individual has the usufruct of the land

and does not skin it, and must be the schoolmaster of the nation in the highest sense.

The scientific method—the method of accurately informed common sense—is the only sane, the only impartial, the only incorruptible and the only efficient method, in government as in everything else. What are the alternatives? Good government carried out by statesmen, based on exact *science*, precise knowledge, and foresight; and bad government carried out by politicians subservient to present interests and personal influences, and based on *nescience*.

So Science is the natural ally of the Government. For in regard to material questions the scientific man of the twentieth century occupies the position of the prophets of old. He alone can say "Thus saith the Lord," for he alone has "waited patiently upon the Lord," and learned His will. Without Science no nation can keep its place in the van. For "Science is the golden guiding star of practice; without science there can only be a blind groping in the region of undefined possibilities."

On behalf of the Hon. Treasurer, Mr. J. R. Garland, who was unable to be present, the Secretary submitted the Financial Statement for the past year, and then moved that its consideration be deferred for a month, as a series of altogether unusual circumstances had combined to prevent the Auditors from carrying out their duties at the appointed time.

No nominations of other Candidates having been received, the President declared the following elections for the opening Session to have been duly made:—

PRESIDENT: A. H. S. Lucas, M.A., B.Sc.

MEMBERS OF COUNCIL (to fill six vacancies): Prof. T. W. E. David, B.A., F.R.S., Henry Deane, M.A., F.L.S., M. Inst. C.E., W. S. Dun, James R. Garland, M.A., Prof. W. A. Haswell, D.Sc., F.R.S., J. H. Maiden, F.L.S., etc.

AUDITORS: Messrs. Duncan Carson and Edward G. W. Palmer, J.P.

The Meeting then adjourned to April 29th, at 8 o'clock.

WEDNESDAY, APRIL 29TH, 1908.

The Adjourned Annual General Meeting of March 25th, 1908, was held in the Linnean Hall, Ithaca Road, Elizabeth Bay, on Wednesday evening, April 29th, 1908.

Mr. A. H. S. Lucas, M.A., B.Sc., President, in the Chair.

The Secretary, on behalf of Mr. J. R. Garland, M.A., Hon. Treasurer, presented the balance sheet for the year 1907, duly certified by the Auditors; and he moved that it be received and adopted, which was carried unanimously.

The President said that the Society had now to say farewell to Mr. Garland in his official capacity as Hon. Treasurer, and that it did so with very great regret. Mr. Garland's business-like management of the Society's finances, his unfailing courtesy, and his disinterested efforts to advance its welfare entitled him to the hearty thanks of the Members. The news of a steady improvement in Mr. Garland's health would be received with great satisfaction.

On the motion of Mr. Hedley, it was resolved, with acclamation, that a record of the Society"s appreciation of Mr. Garland's valuable services should be entered on the Minutes; and that the sincere thanks of the Members, together with their hearty congratulations on his prospective restoration to health, should be tendered to Mr. Garland.

On the motion of Mr. J. H. Campbell it was resolved that the best thanks of the Society should be conveyed to the Honorary Auditors, Messrs. Duncan Carson and E. G. W. Palmer for their kindness and co-operation in carrying out the annual audit.

On the conclusion of the formal business of the Meeting, a very hearty vote of thanks to the President for his able address, dealing with a subject of so much importance to the welfare of the community—the right relations of Science and the Government—was carried with acclamation, on the motion of Mr. R. H. Cambage.

The Linnean Society of New South Wales.

GENERAL ACCOUNT.

Balance Sheet at 31st December, 1907.

Liabilities.	£	s.	d.	Assets.	£	s.	d.	£	s.	d.
Capital: Amount received from Sir William Macleay during his life-time	14,000	0	0	Investments: Loans on Mortgage	17,700	0	0			
Further Sum bequeathed by his Will £6,000, less Probate Duty, £300 ...	5,700	0	0	Fixed Deposit Commercial Banking Co. of Sydney	2,000	0	0			
	£19,700	0	0					19,700	0	0
Income Account at 31st Dec., 1907 ...	85	16	10	Cash: At Bank—Current Account	81	12	10			
				In hands of Secretary ..	4	4	0			
								85	16	10
	£19,785	16	10					£19,785	16	10

Dr. **INCOME ACCOUNT, year ended 31st December, 1907.** Cr.

	£ s. d.	£ s. d.		£ s. d.	£ s. d.
To Salaries and Wages ...		473 3 4	By Balance at 31st Dec., 1906		74 3 3
,, Printing (Publications) ...	302 4 7		,, Subscriptions—		
,, Illustrations	112 14 1		Arrears—£27 6 0		
		414 18 8	1907— 98 14 0		
,, Ground Rent	64 0 0		1908— 2 2 0		
,, Rates	18 10 5			128 2 0	
,, Insurance	8 2 7		,, Entrance Fees	12 12 0	
	90 13 0		,, Interest on Investments ...	795 14 5	
Less charged to Bacteriology Account	21 0 0		,, Sales (including 100 copies of Proceedings purchased by Government)... ...	126 2 3	
		69 13 0			1,062 10 8
,, Renovating Caretaker's House		28 11 0			
,, Bank Charges	1 2 1				
,, Postage, Telegrams, Advertising, and Petties ...	42 7 0				
,, Telephone Rent	5 0 0				
,, Accountancy Fee	5 5 0				
,, Printing (sundries), Stationery, &c....	4 12 0				
,, Iron Safe	6 5 0				
		64 11 1			
		1,050 17 1			
,, Balance to next year ...		85 16 10			
		£1,136 13 11			£1,136 13 11

BACTERIOLOGY ACCOUNT.

Balance Sheet at 31st December, 1907.

Liabilities.	£	s.	d.	Assets.	£	s.	d.
Capital: Amount bequeathed by Sir William Macleay, £12,000, less Probate Duty £600	11,400	0	0	Investments: Loans on Mortgage ...	13,350	0	0
Accumulated Interest ordered by Council to be added to Capital	900	0	0	Cash in Bank, Current Account	423	1	9
Further Amount ordered by Council to be added to Capital	700	0	0				
Interest invested	350	0	0				
	13,350	0	0				
Income Account at 31st December, 1907	423	1	9				
	£13,773	1	9		£13,773	1	9

Dr. **INCOME ACCOUNT, year ended 31st December, 1907.** Cr.

	£	s.	d.	£	s.	d.		£	s.	d.
To Salary and Wages	405	0	0				By Balance at 31st Dec., 1906	303	1	5
,, Petty Cash (Bacteriologist)	6	0	0				,, Interest on Investments	559	6	3
,, Colouring Walls of Laboratory, etc.	6	9	6							
,, Insurance	0	16	5							
,, One-fourth of Ground Rent, Rates, and Insurance on Hall	21	0	0							
				439	5	11				
,, Balance to next year ...				423	1	9				
				£862	7	8		£862	7	8

LINNEAN MACLEAY FELLOWSHIPS' ACCOUNT

Balance Sheet at 31st December, 1907.

Liabilities.	£	s.	d.	Assets.	£	s.	d.	£	s.	d.
Capital: Amount bequeathed by Sir William Macleay, £35,000, less £1,750 Probate Duty...	33,250	0	0	Investments: Loan on Mortgage 33,250	0	0				
Balance from Income Account capitalised in terms of bequest or available for such purpose—				Inscribed Funded Stock at 4%, due August, 1909 ... 1,020	0	0				
On 31st Dec., 1904 £1,020 9 9				Fixed Deposits, Commercial Banking Co. of Sydney ... 2,038	0	0				
On 31st Dec., 1905 1,048 18 6								36,308	0	0
On 31st Dec , 1906 989 2 9				Cash in Bank, Current Account				1,057	16	11
On 31st Dec., 1907 1,057 5 11										
	4,115	16	11							
	£37,365	16	11					£37,365	16	11

Dr. **INCOME ACCOUNT, year ended 31st December, 1907.** Cr.

	£	s.	d.		£	s.	d.
To Salaries of Linnean Macleay Fellows (two)	700	0	0	By Interest on Investments	1,757	5	11
,, Amount transferred to Capital Account	1,057	5	11				
	£1,757	5	11		£1,757	5	11

Audited and found correct, and Securities produced to us.

Duncan Carson
E. G. W. Palmer } Auditors.

30th March, 1908.

J. R. Garland, Hon. Treasurer.

ORDINARY MONTHLY MEETING.

Mr. A. H. Lucas, M.A., B.Sc., President, in the Chair.

Mr. H. E. Finckh, Raglan Street, Mosman, was elected an Ordinary Member of the Society.

The Donations and Exchanges received since the previous Monthly Meeting (November 27, 1907), amounting to 26 Vols., 329 Parts or Nos., 116 Bulletins, 10 Reports, and 80 Pamphlets, received from 118 Societies, &c., and eight Individuals, were laid upon the table.

NOTES ON THE NATIVE FLORA OF NEW SOUTH WALES.

By R. H. Cambage, F.L.S.

Part vi. Deepwater to Torrington and Emmaville.

(Plates i.-ii.)

(Continued from These Proceedings, 1906, p.452).

For purposes of a general classification, the flora of New South Wales may be considered under four sections, which may be roughly described as severally characterising the Coastal Area, the Mountain Area, the Western Slopes, and the Interior. The locality dealt with in this paper falls within the north-western part of the Mountain Area, west of the Great Dividing Range (Text fig.1) and consequently contains some plants which ascend the valleys from the Western Slopes. The presence of some Coastal and Interior plants is also referred to and discussed in relation to geological and climatic influences. The material for this paper was obtained during two short visits to the locality in July and September, 1907, and as the flowers were late owing to the dry spring, many species would necessarily be overlooked, and the list must therefore be regarded as incomplete.

The average annual rainfall in this part of New England is approximately 34 inches, while the general elevation above sea-level varies from about 3,000 to 3,500 feet, or about 4,000 feet around Torrington. Although the rainfall is considerable, it is much less than that on the coast to the eastward, though greater than that of the Western Slopes, which again exceeds that of the Interior. The aspect is chiefly a western one, but owing to the extent and height of the country around

Torrington, parts of the eastern faces are sheltered from western influence, and afford suitable conditions for the growth of some coastal plants. The question of aspect, whether east or west, plays an important part in regulating the distribution of the native flora in this State, and a western aspect in the Mountain Area implies an absence of brush or jungle.

The district is full of interest to one who studies the various influences which operate on the distribution of plant life, for here are found coastal species which flourish on the Triassic sandstone around Sydney, and which at Torrington have sought out a somewhat similar soil derived from a decomposing granite; and although the altitude is so much higher than that of the coast, the temperature of this elevated plateau is modified by the warmth of the more northern latitude. Within this area, also, though generally selecting a different geological formation, are species which belong to the Interior, some even extending into South Australia.

The principal geological formations supporting the flora described may be summarised under the names of blue granite, acid granite (denoting an abundance of silica) and indurated claystone formation. The blue granite occurs chiefly between Deepwater and Stannum, also between Deepwater and Tent Hill. The acid granite produces the flora between Stannum and Torrington, while the indurated claystone is found around Emmaville. The flora of the acid granite area is profuse compared with that of the more open blue granite country, though the

latter produces a much better soil. These igneous rocks have been very fully described by Messrs. E. C. Andrews, B.A., and J. C. H. Mingaye, F.I.C., F.C.S.* Some figures representing constituents of these rocks in other localities, taken from the paper by Messrs. Andrews and Mingaye are most instructive.

	Blue Granite.	*Acid Granite.*
Silica (SiO_2)	65·36 ...	75·78
Alumina (Al_2O_3)	16·37 ...	12·42
Ferric oxide (Fe_2O_3)	1·80 ...	0·55
Ferrous oxide (FeO)	2·68 ...	1·08
Magnesia (MgO)	1·81 ...	0·50
Lime (CaO)	3·82 ...	1·06
Soda (Na_2O)	3·40 ...	3·20
Potash (K_2O)	3·75 ...	4·60

It will be seen that the acid granite has a much higher percentage of silica, but the blue granite possesses a greater proportion of those ingredients which produce good soil.

Deepwater to Stannum.

For a few miles along the road from Deepwater to Stannum the flora is sparse, much of the country having been cleared, especially within the beautiful broad valley through which the Deepwater River flows, but such trees as *Eucalyptus tereticornis* Sm., *E. nova-anglica* Deane & Maiden, *E. conica* Deane & Maiden, (*E. Baueriana* var. *conica* Maiden), *E. viminalis* Labill., *Angophora subvelutina* F.v.M. (Apple), *A. intermedia* DC. (Apple), and *Casuarina Luehmanni* R. T. Baker (Bull Oak), may be seen.

The interest in regard to distribution attaches chiefly to *Eucalyptus conica* and *Casuarina Luehmanni*. The former species occurs principally on the Western Slopes, extending slightly into the Interior, and going almost as far south as the Murrumbidgee. Its exact southern limit is not known to me. South of the Lachlan it is usually found below an altitude of 1,000 feet, owing to its objection to extreme cold; but in coming northwards to warmer latitudes, it is found gradually ascending the valleys,

* Records Geological Survey N. S. Wales, 1907, Vol. viii.

until near Deepwater it grows at an elevation of about 3,200 feet above sea-level. The species is one which prefers river-flats to hills, and from the localities it frequents on northern New England, it can generally be traced along the valleys to the lower country on the Western Slopes. Mr. Andrews has drawn my attention to the fact that it is a lover of the blue granite.

The occurrence of *Casuarina Luehmanni* at Deepwater is of greater interest than that of *Eucalyptus conica*, as the former is a more typical Interior tree, and continues southerly across the north-western part of Victoria into South Australia. Specimens of this Casuarina have also been collected 7 miles beyond Wallangarra in Queensland by Mr. E. C. Andrews, and it is common on the watershed of the Upper Hunter and Goulburn Rivers, having crossed the lower portion of the Liverpool Range from the west. Its size around Deepwater quite equals that attained in the western districts.

It has been noticed that many plants which belong to the Western Slopes and which are restricted to comparatively low levels in the south, appear to ascend very considerably on western New England. This great difference is probably to some extent due to the very cold influence in the south, which radiates from the snow-clad heights of Kosciusko, whose altitude exceeds 7,000 feet. If a similar mountain area of equal height existed in the north of this State, it would be likely to prevent the ascent of many western species to their present elevations. If, on the other hand, the local conditions were the same throughout the Mountain Area, the upper limit of the plants of the Western Slope would rise with greater regularity along a more even grade. It is probable the diminished effect in the north of the cool southerly wind exercises some important influence in the matter, as although the elevation is greatest in the south, the land mass which exceeds, say, 3,000 feet, is greater in extent in the north.

Around Stannum and Torrington.

The country around Stannum and Torrington, which ranges from 3,400 to about 4,000 feet, consists chiefly of hills composed

of acid granite, often known as tin-granite, from its association with valuable tin deposits. Quartz is so abundant that the disintegration of this coarse granite results in the production of a soil as sandy as that derived from the weathering of the Triassic sandstone near Sydney and on the Blue Mountains. The effect of geological influence on the vegetation is very apparent on this particular area, for many Sydney species are thriving here, imparting to the locality much of the appearance of a typical sandstone flora. Appended is a list of plants noticed on this acid granite formation extending from Stannum to Torrington :—

Ranunculaceæ : *Clematis glycinoides* DC., *Ranunculus lappaceus* Sm. (Buttercup).

Dilleniaceæ : *Hibbertia stricta* R.Br., *H. vestita* A. Cunn., *H. linearis* R.Br., *H. diffusa* R.Br. (a shapely little shrub about 3-4 feet high, growing among the acid granite rocks, and flowering in November).

Violarieæ : *Viola betonicæfolia* Sm., *V. hederacea* Labill.

Pittosporeæ : *Billardiera scandens* Sm. (a twining plant).

Polygaleæ : *Comesperma sylvestre* Lindl.

Sterculiaceæ : *Sterculia diversifolia* G. Don, (Currajong) on andesite formation.

Geraniaceæ : *Oxalis corniculata* L.

Rutaceæ : *Zieria lævigata* Sm., *Boronia ledifolia* J. Gay var. *pinnata*, *B. microphylla* Sieb., *Phebalium glandulosum* Hk., *P. rotundifolium* A. Cunn., *Correa speciosa* Andr., (Native Fuchsia).

Olacineæ : *Olax stricta* R.Br.

Celastrineæ *Celastrus Cunninghamii* F.v.M.

Stackhousieæ : *Stackhousia linariæfolia* A. Cunn.

Rhamneæ : *Cryptandra amara* Sm.

Sapindaceæ : *Dodonæa viscosa* L., and var. *attenuata* (Hop Bush).

Leguminosæ : *Mirbelia speciosa* Sieb., with most beautiful purplish flowers; *M. pungens* A. Cunn., *Gompholobium* sp., *Jacksonia scoparia* R.Br., (Dogwood); *Daviesia latifolia* R.Br., often

called Hopbush, covered in September with racemes of attractive orange-yellow flowers; *D. ulicina* Sm., *D. acicularis* Sm., *D. genistifolia* A. Cunn., *Aotus villosa* Sm., *Pultenæa foliolosa* A. Cunn., *P.* sp. (No.1621), probably new species; *Dillwynia ericifolia* Sm. var. *phylicoides* Benth., *D. juniperina* Sieb., *Bossiæa microphylla* Sm., *B. Scortechinii* F.v.M., prostrate, with dark yellow flowers; *Hovea linearis* R.Br., *H. longifolia* R.Br., *Indigofera australis* Willd., *Glycine clandestina* Wendl., *Hardenbergia monophylla* Benth., (False Sarsaparilla, a twining plant with beautiful purple flowers); *Acacia lanigera* A. Cunn., var. *venulosa*; *A. juniperina* Willd., *A. penninervis* Sieb., *A. neriifolia* A. Cunn., *A. linifolia* Willd., *A. lunata* Sieb., *A. viscidula* A. Cunn., *A. implexa* Benth., *A. longifolia* Willd., *A. spectabilis* A. Cunn., *A. decurrens* Willd., *A. Murrayana* F.v.M., ? *A.* sp. (Nos. 1622 and 1622A).

ROSACEÆ: *Rubus* sp.

CRASSULACEÆ: *Tillæa verticillaris* DC.

DROSERACEÆ: *Drosera peltata* Sm.

HALORAGEÆ: *Haloragis* sp.

MYRTACEÆ: *Calythrix tetragona* Labill., *Thryptomene ciliata* F.v.M., *Bœckea* sp., *Leptospermum flavescens* Sm., *L. arachnoideum* Sm., *L. stellatum* Cav. (a rough brown scaly barked Tea-tree), *L. myrsinoides* Schl., *Callistemon lanceolatus* DC. (?), along banks of small creeks; *C. pityoides* Miq., *Angophora intermedia* DC., (Apple Tree; not noticed on the acid granite); *Eucalyptus capitellata* Sm. (Brown Stringybark), *E. macrorrhyncha* F.v.M. (Red Stringybark); *E. melliodora* A. Cunn., (Yellow Box or Yellow Jacket); *E. hemiphloia* F.v.M., (Box, near Stannum; not on acid granite); *E. viminalis* Labill., (White Gum, or Manna Gum; not on the acid granite); *E. tereticornis* Sm., (Forest Red Gum); *E. Banksii* Maiden, (on small round hill just south of 14-mile post); *E. Bridgesiana* R. T. Baker (White Peppermint, one of the trees recognised by Baron von Mueller as *E. Stuartiana* F.v.M.), *E. eugenioides* Sieb. (White Stringybark); *E. rubida* Deane & Maiden (*E. Gunnii* var. *rubida* Maiden, a White Gum); *E. Andrewsi* Maiden (Blackbutt); *E. Deanei* Maiden (Brown

Gum); *E. Bancrofti* Maiden (*E. tereticornis* var. *brevifolia* Benth.; Brittle or Cabbage Gum).

Umbelliferæ: *Xanthosia* sp., *Actinotus Helianthi* Labill. (Flannel Flower).

Araliaceæ: *Panax sambucifolius* Sieb.

Loranthaceæ: *Loranthus pendulus* Sieb. (Mistletoe).

Rubiaceæ: *Pomax umbellata* Sol., *Asperula oligantha* F.v.M., *Galium umbrosum* Sol.?

Compositæ: *Olearia chrysophylla* A. Cunn., *O. ramulosa* Labill. (sometimes locally called Wild May); *O. ramosissima* Benth., *O.* sp., *Brachycome* sp., *Craspedia Richea* Cass. (Billy Buttons); *Cassinia aculeata* R.Br., *C. lævis* R.Br., *Helichrysum scorpioides* Labill., *H. bracteatum* Willd. (Everlasting Flower); *H. apiculatum* DC., *H. obcordatum* F.v.M., *Helipterum anthemoides* DC.

Stylidieæ: *Stylidium laricifolium* Rich. (a Trigger-flower), *S. graminifolium* Sw. (the common Trigger Flower).

Goodeniaceæ: *Goodenia geniculata* R.Br., *G. rotundifolia* R.Br., *G. bellidifolia* Sm., *Dampiera stricta* R.Br.

Campanulaceæ: *Wahlenbergia gracilis* DC. (Blue Bell).

Epacrideæ: *Styphelia viridis* Andr. (Five Corners); *S. læta* R.Br. (?), *Melichrus urceolatus* R.Br., *M. rotatus* R.Br., *Brachyloma daphnoides* Benth. (flowers sweet-scented); *Lissanthe strigosa* R.Br., *Leucopogon lanceolatus* R.Br., *L. microphyllus* R.Br. var. *pilibundus* Benth.; *L. melaleucoides* A. Cunn., *L. muticus* R.Br., *L. neo-anglicus* F.v.M., *Monotoca scoparia* R.Br., *Epacris microphylla* R.Br.

Jasmineæ: *Notelæa linearis* Benth.

Solaneæ: *Solanum parvifolium* R.Br. (Prickly Apples).

Scrophularineæ: *Veronica Derwentia* Andr., *Euphrasia Brownii* F.v.M., *E. scabra* R.Br.

Labiatæ: *Plectranthus parviflorus* Willd. (small succulent plant with blue flowers, on flat rocks); *Prostanthera empetrifolia* Sieb., *P.* sp. (No. 1718, probably a new species), *P.* sp., *Ajuga australis* R.Br.

Laurineæ: *Cassytha pubescens* R.Br.

U. OF ILL. LIB.

Proteaceæ: *Petrophila sessilis* Sieb., *Conospermum taxifolium* Sm., *Persoonia cornifolia* A. Cunn., *P. sericea* A. Cunn., *P. tenuifolia* R.Br., *P.* sp., *Grevillea trinervis* R.Br., *G. linearis* R.Br., *Hakea microcarpa* R.Br., *H. dactyloides* Cav., *Lomatia silaifolia* R.Br., *Banksia collina* R.Br., *B. integrifolia* L.f.(White Honeysuckle).

Thymeleæ: *Pimelea linifolia* Sm.

Euphorbiaceæ: *Poranthera corymbosa* Brongn., *Phyllanthus thymoides* Sieb.

Urticeæ: *Urtica incisa* Poir.(Nettle).

Casuarineæ: *Casuarina suberosa* Ott. & Dietr.(Black Oak).

Santalaceæ: *Choretrum spicatum* F.v.M., *Exocarpus cupressiformis* Labill.(Native Cherry), *E. stricta* R.Br.

Coniferæ: *Callitris calcarata* R.Br.(Black Pine).

Orchideæ: *Dendrobium speciosum* Sm.(Rock Lily), *Dipodium punctatum* R.Br., *Thelymitra media* R.Br., *Diuris pedunculata* R.Br.(on wet flats), *D. abbreviata* F.v.M., *Caladenia carnea* R.Br. var. *alba*; *Glossodia major* R.Br.(Blue Orchid).

Irideæ: *Patersonia sericea* R.Br.(Wild Iris).

Amaryllideæ: *Hæmodorum planifolium* R.Br.

Liliaceæ: *Eustrephus latifolius* R.Br., *Wurmbea dioica* R.Br., *Tricoryne elatior* R.Br., *Stypandra glauca* R.Br.(covered in September with beautiful bright blue flowers).

Juncaceæ: *Xerotes longifolia* R.Br., *Xanthorrhœa* sp.(Grass Tree), *Luzula campestris* DC.

Cyperaceæ: *Cladium glomeratum* R.Br., *Gahnia* sp., *Caustis pentandra* R.Br.

Gramineæ: *Themeda Forskalii* Hack.(*Anthistiria ciliata* L., Kangaroo Grass); *Dichelachne sciurea* Hook.

Filices: *Davallia pyxidata* Cav.(Hare's-Foot Fern); *Adiantum Aethiopicum* L.(Maidenhair Fern), *Cheilanthes tenuifolia* Sw., *Pteris aquilina* Linn.(Bracken); *Blechnum cartilagineum* Sw., *Asplenium flabellifolium* Cav., *Polypodium punctatum* Thunb., *P. serpens* Forst.

Although *Sterculia diversifolia* was found growing close to Stannum, it was on an andesite formation, and was not noticed

on the granite. This species is also rare on the purely sandstone soils around Sydney and on the Blue Mountains. The fact of its occurrence at an elevation of about 3,400 feet in this Mountain Area, while at the same time it flourishes in the dry Interior near Cobar, etc., furnishes evidence of its adaptability to environment. Its home, however, is usually below an altitude of 2,000 feet in New South Wales.

The widely distributed *Correa speciosa* (sometimes called Wild Fuchsia) was noticed at intervals on the granite, and displayed the usual variation in the colour of its long tubular flowers, some being creamy-white, while others were red with green tips.

An interesting species of Pultenæa (Nos.1621 and 1621A) was found growing in the swampy land or wet flats, and flowering at the end of September. The plants usually consist of a single stem, though sometimes branching, up to about 2 feet, terminating in a dense head of bright yellow florets. This appears to be a new species.

The locality has a plentiful supply of Wattles, thirteen species of Acacia being noticed. Although the plant identified as *A. Murrayana* was flowering in July, no pods were procurable in September to assist in the determination of this Acacia which seems to be rare in New South Wales. *A. viscidula* is a spreading shrub about 3-4 feet high, and occurs among the flat granite rocks. An Acacia (No.1622) about 10-12 feet high was seen on the granite formation, having reddish-brown stems, long narrow 1-nerved phyllodia, and very (young) long narrow pods.

Eucalyptus capitellata is common around Torrington, and has very large coarse leaves. This species is found on Mount Lofty in South Australia, and continues intermittently through Victoria and along the eastern part of New South Wales to the locality under discussion.

Casuarina Luehmanni comes from the drier parts of South Australia and Victoria, through the interior of this State; and it is of interest to note that these two species have arrived, by totally different routes, at a spot which is climat ca y suitable

to both. This affords another instance of the gradual adaptability of plants.

The geological conditions required by these two trees are, however, quite distinct, and *C. Luehmanni* is never associated with *Eucalyptus capitellata*, though they may occur on their respective formations only a few miles apart.

The buds of *Eucalyptus macrorrhyncha* were noticed to resemble those of *E. capitellata*, and there was an absence of the suddenly tapering pointed opercula so common on the southern parts of the Western Slopes.

The occurrence of *E. melliodora* (Yellow Box) in this locality is not surprising, for its versatility in withstanding both heat and cold has often been noticed. It, however, prefers a western to an eastern influence in this State.

Both *E. viminalis* and *E. rubida* (White Gums) were seen near Stannum; and in the absence of their distinctive "sucker" leaves, which are narrow-lanceolate and orbicular respectively, these trees look very similar in the forest. Although they are often found growing side by side on basalt and other formations, such was not the case here, for while *E. viminalis* flourished on the andesite, it appeared to be absent from this particular sandy granite formation. *E. rubida*, however, was well distributed over the granite area, but not noticed on the andesite.

E. Andrewsi, the Blackbutt of northern New England, is plentiful on the granite, but seems absent from the andesite around Stannum. This tree appears to be one of the principal Eucalypts found on this class of acid granite, and is also one of the largest. Although it occurs practically all over New England, and comes south on to the high range which separates the waters of the Manning from those of the Hunter, and has been collected by Mr. Andrews near Copeland, there is so far no record of its having crossed to the southern side of the Hunter and Goulburn valleys. The species may therefore be useful in connection with any research into the relative ages of the Hunter valley and certain members of the genus Eucalyptus. Though *E. Andrewsi* is of comparatively large size west of the Main

Divide, it attains its greatest dimensions along the eastern margin of New England under a coastal, as opposed to a westerly influence. This species occurs at Maryland and Stanthorpe in Queensland, according to Mr. Andrews.

Another interesting Eucalypt occurring abundantly between Stanthorpe and Torrington is *E. Deanei*, locally called Brown Gum. This is another coastal form which extends as far south as Picton Lakes, where it is known as Blue Gum, giving rise to the name of the creek which flows from the lake. It is found on various tributaries of the Hawkesbury and Hunter, and gradually ascends the eastern face of the New England plateau, till towards the north it crosses to the western watershed. Its noble and stately proportions, as seen along the Burragorang valley in the south, where the combined conditions of warmth, shelter and moisture all contribute to a luxurious growth, are missing in this north-western area. Though in the north-west it is still comparatively large, its exposure in a more elevated climate has resulted in diminished stature, and probably also in its being coated with the brown flaky bark which has suggested the local name for the species.

E. tereticornis, the Forest Red Gum so widely known over the Coastal and Mountain Areas and Western Slopes, is distributed over both the andesite and granite formations around Stannum.

E. Bancrofti was not only restricted to the granite area, but was practically confined to the rocky and higher parts, only following to lower levels while attended by the influence of the acid granite. It appears open to question whether this is a distinct species or merely a variety of *E. tereticornis*.* That it has strong affinities to the latter is beyond doubt, but after carefully observing both trees in various localities I am disposed to regard the former as sufficiently distinct to warrant its having specific rank. It seems possible that *E. Bancrofti* may have developed in some way by environment over long ages as a form of *E. tereticornis*, and by constantly selecting these somewhat elevated hard

* See ' The Forest Flora of New South Wales,' Part xi. By J. H. Maiden.

acid granite areas, has gradually assumed its present character. Its usually shorter, paler and more orbicular leaves are generally distinct from those of *E. tereticornis*, though the variation in form and size is considerable; while the subcylindrical operculum is a very marked feature of *E. Bancrofti*. The timber is much inferior to, and more brittle than, that of *E. tereticornis*, and of a deeper red colour, being little paler when freshly cut than the timber of *E. squamosa* Deane & Maiden. A fairly constant distinctive feature in the fruits of the two species may be noticed in the valves, for while those of *E. tereticornis* are plainly continuous on the edge of the domed rim, those of *E. Bancrofti* have the appearance of being placed inside the rim, and are usually longer and paler. In the forest, however, there seems to be no difficulty whatever in separating the two trees by the bark alone, for that of *E. Bancrofti* is never in long flakes, but breaks off in very short pieces, settling around the base of the tree in broken fragments, sometimes with almost a powdery appearance and evidently indicating its brittle nature. In its bark (though more of a grey colour), and straggling habit, this tree has sometimes the appearance of *Angophora lanceolata* Cav., a so-called Red Gum growing near Sydney. *E. Bancrofti* will sometimes descend to the base of the hills and associate with *E. tereticornis*, though retaining its distinctive characters. In one instance this was noticed where two young trees, one of each species, were growing only a foot apart. *E. Bancrofti* occurs in Queensland, and although in New South Wales its home is on the tin-granites of northern New England and its western slopes, it has been recorded by Mr. Maiden from Port Macquarie, whilst its most definite southern limit known to me is Murrurundi.

Many of the trees of *E. eugenioides* were noticed to be in full flower early in July.

Olearia ramosissima was also in bloom, the small bushes being covered with a profusion of pale blue flowers which were eagerly sought after by the local residents for table decorations. *O. ramulosa*, a plant which around Sydney is often known as Snow-bush, from the mass of white flowers it bears, was in a much less

advanced stage, scarcely any flowers of this species being seen in July. Around the Inverell district this plant is sometimes known as Wild May.

Melichrus urceolatus is a very common little plant on the granite area, though it is by no means confined to that formation, and was met with frequently throughout.

Leucopogon lanceolatus showed scarcely any signs of flowering early in July, and *L. melaleucoides* was just beginning to open into flower. *L. microphyllus* var. *pilibundus* ranges from about 2-3 feet high, and was absolutely covered with masses of snow-white blossoms which were freely used for decorative purposes. This Leucopogon might fitly be called a Snowbush, for its clusters of pure white, little, bearded flowers are so dense as to exactly represent a plant just visited by a snowstorm. It was still flowering at the end of September. The leaves, which are about 4 lines long, have small recurved points, so that if the hand be passed upward among the branches, the small resisting hooks are distinctly felt.

Prostanthera empetrifolia was restricted to the damp swampy areas, and its reddish-purple flowers were just opening at the end of September. This species has slender stems which are often supported by the adjacent plants; and though its height seemed commonly about 2-4 feet, it was found in one instance to reach 6 feet while resting on its stronger neighbours.

A second Prostanthera (No.1718), which is probably a new species, occurs almost exclusively in the slight depressions where a little soil can accumulate on the dry, almost bare acid granite rocks. Here the plants flourish in clusters about 3 feet high, being covered in September with a most attractive display of purplish-blue flowers. The leaves when crushed emit a strong odour, a feature common in the genus, accounting for the local name of Turpentine for this species.

Hakea microcarpa was noticed on swampy land, a situation that it often selects on New England; while *H. dactyloides* sought out the sandy areas as it does around Sydney and on the Blue Mountains.

Banksia integrifolia, White Honeysuckle, is typical of this sandy granite formation, and was noticed up to 30-40 feet high. As regards geographical distribution this is a most interesting species. In the Sydney district it appears to be almost entirely restricted within a narrow strip along the sea-shore, seldom extending back from the ocean or salt estuaries more than a few miles. It does not appear to be common on the Blue Mountains, though it occurs there, sometimes in a stunted form. In going inland from the North Coast, however, it seems to altogether disregard its shore-loving tastes, and gradually works its way up to the New England plateau, using these sandy granite areas as stepping stones, until it crosses the Great Dividing Range to the locality now described. At an elevation of 3,600 feet, and quite removed from ocean-influence, it is growing as luxuriantly as those ornamental representatives at Kurnell and Narrabeen. It would therefore seem that the distribution of this species is to a greater extent governed by the chemical constituents in the soil than by the consideration of either climate or aspect. The juvenile foliage was noticed around Torrington to be truncated and serrated similar to that growing at Narrabeen, while the mature leaves were practically entire. *B. collina* was found as shrubs about 3-5 feet high in wet flats at Torrington.

Another tree typical of this granite area is *Casuarina suberosa* (Black Oak), and it occurs abundantly at elevations exceeding 3,600 feet. Cones were collected up to 1½ inches long.

Dendrobium speciosum (Rock Lily) seems rare, only a few plants being seen in the cleft of a large granite rock; but even these were scarcely expected in a locality so far removed from coastal influence.

Davallia pyxidata (Hare's-Foot Fern) also came somewhat as a surprise for the same reason, but this species was more plentiful than the Rock Lily.

In These Proceedings for 1906,(p.63) Mr. J. H. Maiden, F.L.S., has described the flora of Howell, south of Inverell, where the formation is also an acid granite, perhaps containing a slightly higher percentage of silica than the rocks at Torrington. After allowing

for the greater westerly influence and lower altitude of Howell, which averages about 1,000 feet less than Torrington, a most interesting and instructive comparison of these two floras can be made, showing how important is the geological factor in regulating the distribution of our native plants.

Torrington to Emmaville.

The road from Torrington to Emmaville, which is southerly about 16 miles, soon passes out of the acid granite, and enters an area of andesite and what is locally known as blue granite. The absolute change of the flora after leaving the acid granite is most remarkable, and it seems no exaggeration to estimate that quite 80 per cent. of the plants are left behind. Amongst those noticed during a hurried drive before Tent Hill was reached at 12 miles were :—

Sterculia diversifolia, *Jacksonia scoparia* (Dogwood), *Angophora subvelutina*, *Eucalyptus viminalis*, *E. albens* Miq. (White Box); *E. nova-anglica* (Red or Black Peppermint); *E. dealbata* A. Cunn., *E. tereticornis*, *E. macrorrhyncha*, *E. melliodora*, *Casuarina Cunninghamiana* (River Oak, on Glen Creek), and *Xanthorrhœa* sp. (Grass-Tree).

It was of interest to notice that *Sterculia diversifolia* and *Eucalyptus viminalis* appeared immediately the andesite was reached.

E. nova-anglica occurs on the better soil in the valleys, and near Glen Creek. The species is one which is typical of good, fairly damp soils, and is therefore a well known tree in the settled districts of New England. (For previous remarks see These Proceedings, 1904, p.795).

E. albens is the White or Grey Box tree which practically defines the east and west limits of the area referred to by me as the Western Slopes; and although south of the Murrumbidgee it is rarely found at an elevation exceeding 1,300 feet above sea-level, it climbs to 3,000 feet around Emmaville, the highest point observed being on the Bald Nob, which reaches about 3,200 feet. It is of interest to find that this tree manages to ascend

almost to the New England Plateau, but this it accomplishes by creeping up the sides of the valleys where it secures shelter from coastal influence, for its great desideratum is a western aspect. North of Emmaville it follows up the valley of the Beardy River and Glen Creek, gradually establishing itself at such high levels as to come within some of the winter snow-storms. It advances towards Glen Innes along the valley of the MacIntyre River above Inverell, where the basaltic formation suits it so admirably, and is the principal tree in giving a characteristic appearance to the local flora.

Reflecting on the qualities which a plant possesses for resisting extremes of temperature and moisture, the thought is suggested that possibly in some instances after thousands of years of gradual adaptation to opposite conditions, extreme forms are evolved which in time may be regarded as separate species. Something of this kind may explain the great similarity which exists between *E. albens* of the west and *E. hemiphloia* F.v.M., a common Box tree along the coast. It is still a matter of opinion among botanists whether these are two distinct species, or one a variety of the other; but it seems highly probable, considering the close affinities between them, that both had a common origin, and have developed their present characteristics owing to the various influences of environment.

A gum tree often associated with *E. albens* in rocky situations is *E. dealbata* A. Cunn. (*E. tereticornis* var. *dealbata* Deane & Maiden). This is a tree with strong affinities to *E. tereticornis*, and may perhaps be justly regarded as only a variety of that species. In these Proceedings for 1900 (p.712) I have suggested that *E. dealbata* may perhaps be regarded as a form of *E. tereticornis* which grows chiefly on ridges, and incline to the opinion that it may be considered as a variety, although characteristic differences are referred to. During the intervening years a close study of the habit and distribution of these trees satisfies me that there are fairly constant differences between them sufficient to make it desirable that *E. dealbata* should rank as a species. The chief botanical differences appear to be in the truncate and

usually sessile fruit of *E. dealbata*, and the pedicellate domed fruit of *E. tereticornis*. In the forest one is often assisted in separating the two species by the very glaucous foliage and buds of the former, and often by its drooping habit. Its timber is also inferior to that of *E. tereticornis*. *E. dealbata* undoubtedly seems to favour a western influence, and elevated or ridgy land; and a knowledge of its habits is often unconsciously used as an assistance in its identification. Around Emmaville the two trees are growing side by side, but there is rarely any difficulty in separating them by a general inspection. Probably this is another instance of two closely allied trees having had a common origin, and, owing to certain conditions of environment, have gradually developed differences which may perhaps now be regarded as sufficient to entitle each to specific rank. It is noteworthy that there is probably no species of Eucalyptus with more forms possessing features which just barely bestow the right to specific rank than *E. tereticornis*.

It may be pertinent to point out that in considering the relationship of species and varieties among native plants, it is customary for the botanist to regard the form which happens to have been first discovered and described as the species or type, and those which may have been found later as varieties, without any reference to the question as to which of them may naturally be more closely related to the original form. It is therefore highly probable that some of the botanist's so-called species may be merely later forms which have been evolved from an older stock, though the latter now happens to be styled a variety. In New South Wales, therefore, the botanist's varieties are generally found in localities remote from Port Jackson, whence many of the types came.

Just north of Tent Hill, on the fairly open hillside among *E. dealbata* and *E. albens*, *Jacksonia scoparia* was very abundant, being quite a feature in the landscape.

The trees of *Casuarina Cunninghamiana* along the banks of Glen Creek were the only River Oaks noticed within the area described, and the species would probably be more abundant at lower levels.

Around Emmaville.

The plants observed around Emmaville in July were:— *Hibbertia linearis* R.Br., *H. serpyllifolia* R.Br., *Billardiera scandens* Sm., *Sterculia diversifolia*(Currajong), *Boronia ledifolia*, *B. microphylla*(?), *Dodonæa viscosa*, *Gompholobium* sp., *Jacksonia scoparia*, *Daviesia genistifolia*, *D. latifolia*, *Pultenæa microphylla* Sieb., *Dillwynia ericifolia* Sm. var. *phylicoides* Benth., *Bossiæa buxifolia* A. Cunn., *Hovea linearis*, *Indigofera australis*, *Hardenbergia monophylla*, *Acacia decurrens*, *A. linifolia*, *A. implexa*, *A. spectabilis*, *A. neriifolia*, *A. penninervis*, *A. lanigera* var. *venulosa*, *A. Dawsoni* R. T. Baker, *Kunzea capitata* Reichb., *Melaleuca thymifolia* Sm., *Angophora subvelutina*, *A. intermedia*, *Eucalyptus tereticornis*, *E. dealbata*, *E. eugenioides*, *E. melliodora*, *E. Banksii*, *E. macrorrhyncha*, *E. Andrewsi*, *E. crebra* F.v.M.(Narrow-leaved Ironbark); *E. Caleyi* Maiden (Drooping Ironbark), *E. conica*(Fuzzy Box or Apple-Box), *E. albens*, *E. nova-anglica*(near Tent Hill), *E. Bridgesiana*, *Loranthus* sp., *Pomax umbellata*, *Olearia ramosissima*, *O. ramulosa*, *Brachycome* sp.(Wild Daisy), *Cassinia* sp., *Helichrysum apiculatum*, *Wahlenbergia gracilis*(Blue Bell), *Melichrus urceolatus*, *Brachyloma daphnoides*, *Lissanthe strigosa*, *Leucopogon collinus* R.Br.(on low ridge about 1 mile north-west of Emmaville), *Monotoca scoparia* R.Br., *Notelæa microcarpa* R.Br.(known as Ginggie near Attunga); *Solanum parvifolium*, *Prostanthera nivea* A. Cunn., *Cassytha* sp., *Persoonia cornifolia*(Geebung), *P. sericea*(?), *P.* sp., *Phyllanthus thymoides*, *Casuarina suberosa*, *C. Luehmanni*, *C. paludosa* Sieb.(?), *Exocarpus cupressiformis*, *Callitris calcarata*(Black Pine), *Stypandra glauca*, *Xanthorrhœa* sp., *Themeda Forskalii*(Kangaroo Grass), *Cheilanthes tenuifolia* (a small fern among the rocks).

Acacia Dawsoni R. T. Baker was described in 1897, from specimens collected near Rylstone, and has been only once recorded since, the second locality being at Abercrombie, about 100 miles south (These Proceedings, 1906, p.714). Its discovery at Emmaville, some 250 miles northerly from Rylstone, extends its range considerably, but an interesting fact in regard to its distribution is that Emmaville is in the same plant-zone as Ryl-

stone or just on the border-land of the Mountain Area and the Western Slopes, so that its occurrence at these two fairly distant spots is less remarkable than might appear at first sight. It is growing about 3 miles northerly from Emmaville on the track to Bald Nob; and the plants, which are scatterred over several acres, average about one foot high. The elevation of the locality is nearly 3,000 feet above sea-level, being about 1,000 feet higher than Rylstone, but owing to the difference of latitude, the change in climate is only equal to that produced by a few hundred feet.

Eucalyptus Banksii occurs on the hills easterly from Emmaville, and by the casual observer, might easily be confused with *E. Bridgesiana* (White Peppermint), but its clustering, sessile buds and fruits, as well as its more strictly opposite juvenile foliage and smoother twigs, enable it to be readily separated from that species.

In describing *E. Banksii* in These Proceedings (1904, p.774) Mr. Maiden pointed out its similarity to *E. Stuartiana* (*E. Bridgesiana*), and *E. Cambagei* Deane & Maiden. This resemblance in the forest was very striking both at Emmaville and Torrington (a new locality for the species), but its affinities with *E. goniocalyx* F.v.M., were not pronounced, as the latter is more of a smooth-barked gum-tree.

E. Caleyi is an Ironbark which was noticed near the Bald Nob, a few miles northerly from Emmaville, and is a conspicuous tree owing to its drooping glaucous foliage (Plate i.). Its timber, though good, does not appear to be eagerly sought after owing to its hardness, and its severity on the saw when being cut in the mill. It evidently prefers a western to an eastern influence.

In a few instances a tree was noticed in a group of Ironbarks, with an almost smooth, brown box-bark, but in other respects with all the characteristics of *E. Caleyi*. The same feature has been observed at Copeton, and Mr. Andrews has reported it to me from other localities. It is remarkable that amongst so many of our Ironbark forests, a tree occurs at intervals having decided affinities with the local Ironbark, but generally showing some

transit to the local Box, which in this case is *E. albens;* and the occurrence naturally suggests hybridization. In some instances the fruits, timber, and bark are of an intermediate character; but so far as my brief observations have gone, it would appear that the particular trees under discussion have nearly all the features of *E. Caleyi* without the usual rough bark. Few bushmen would be induced to consider the tree to be the same as the Ironbark, without working the timber.

E. crebra, the Narrow-leaved Ironbark, is fairly common around Emmaville at altitudes up to 3,000 feet, but the width of the leaves is variable. Although it grows with *E. Caleyi,* the two species are easily distinguished by the general contrast between the dark-coloured foliage of the former, and the glaucous, often drooping appearance of the latter (Plate ii.).

Only a little of *Casuarina Luehmanni* (Bull Oak) was seen, and this was about two miles southerly from Emmaville, in company with other western plants. *C. inophloia* F.v.M., the oak tree with a semi-fibrous bark, was not noticed near Emmaville, but it occurs about ten miles away, near the Severn River on the Inverell Road.

Tent Hill to Deepwater.

From Tent Hill to Deepwater is 14 miles easterly. The geological formation for many miles is blue granite, then sandy slates, with the exception of some basalt near the 4-mile post. Much of the country has been cleared, but the flora on the blue granite is always sparse compared with that of the acid granite. The following plants were noticed by the roadside :—*Hibbertia linearis, Sterculia diversifolia, Jacksonia scoparia, Daviesia latifolia, Hardenbergia monophylla, Acacia linifolia, A. implexa, A. decurrens, Angophora intermedia, A. subvelutina, Eucalyptus melliodora, E. nova-anglica, E. Bridgesiana, E. tereticornis, E. albens, E. conica, E. viminalis* (first seen between the 8- and 9-mile posts from Deepwater), *E. eugenioides* (at about 3 miles from Deepwater), *Helichrysum apiculatum, Melichrus urceolatus, Lissanthe strigosa, Pimelea* sp., and *Casuarina Luehmanni.*

Two well-known New England trees, viz., *Eucalyptus coriacea* A. Cunn.(White Ash of the north, or Snow Gum of Kosciusko) and *E. stellulata* Sieb.(Black Ash or Black Sally), seem absent from the locality examined, but had there been any extent of basaltic soil both species might have been expected.

Among the various features connected with the flora of the area described, perhaps the most notable observed was the remarkable way in which a large number of Sydney plants had crossed the Main Dividing Range, and acclimatised themselves at an elevation approaching 4,000 feet above sea-level, either chiefly owing to their having discovered a suitable geological formation with a fair rainfall, and some shelter from the cold and drying effects of westerly gales, or that the westerly influence becomes less as northern latitudes are approached.

Other matters of extreme interest are the richness of the acid granite flora, and the exclusiveness of some species for their favoured geological formations.

I am much indebted to Messrs. J. H. Maiden, F.L.S., and E. Betche for assistance in identifying some of the plants.

My thanks are due to Mr. E. C. Andrews, B.A., for assisting me to complete my collections, and for useful hints in regard to the influence of the local geological formations with which he is familiar.

I have also to thank Miss Daisy Hawkins of Torrington for sending flowers which were not procurable at the time of my visit.

EXPLANATION OF PLATES.

Plate i.

Eucalyptus Caleyi Maiden, Drooping Ironbark.

Plate ii.

Eucalyptus crebra F.v.M., Narrow-leaved Ironbank, on the right; *E. Caleyi* Maiden, Drooping Ironbark, on the left.

NOTE ON THE BREEDING HABITS OF THE RED BELLIED NEWT (*MOLGE PYRRHOGASTRA* Boie).

By Edgar R. Waite, F.L.S., Curator, Canterbury Museum, Christchurch, N.Z.

On August 31st, 1904, I exhibited before the Society living examples of the Asiatic Red-bellied Newt, (*Molge pyrrhogastra* Boie)* and though I kept them, in Sydney, until my removal in April last year, they showed no signs of breeding.

At the breeding season last year, the Newts were exhibited at the New Zealand International Exhibition, but they were not then suitably housed for breeding purposes.

This season, however, they were returned to the tank in which I kept them in Sydney, and with the exception of the exigencies of climate, they are under precisely similar conditions.

The first eggs were laid on October 10th, and hatched on December 12th; subsequent eggs also required about sixty days for incubation, the temperature of the water ranging from 55° to 65° F. The tank is well supplied with plants, including *Vallisneria*, *Anacharis* and *Myriophyllum*, but in every instance the first-named was selected. The procedure does not appear to differ from that of the Crested Newt of Britain (*Molge cristata* Laur.), as detailed by Rusconi and Bell,† for though I formerly kept both adults and tadpoles of this species, I never actually bred it.

The Red-bellied Newt, as watched in my vivarium, usually employs a terminal floating portion of a leaf of *Vallisneria* and folds it upon itself, the leaf being often cracked in the process. The leaf is glued in this position, and the single egg, placed

---

* These Proceedings, 1904, xxix., p.557.

† "British Reptiles," 1839, p.122.

within the fold, is similarly secured. More rarely an egg is placed between two leaves where they cross each other, the two being glued together. Occasionally a detached portion of a leaf is used, and fixed against the wall of the tank, always, however, at the surface of the water. If removed from the plant an egg sinks, but the primary object of the attachment appears to be protection, for I have intentionally detached some eggs and they have developed equally well on the bottom.

The larvæ have grown rapidly since they were hatched, ten days ago, but if their subsequent development is as slow as that of *Molge cristata*, as recorded by Higginbottom,* it will be fully three years before they are mature, even if I am successful in rearing them.

*Ann. Mag. Nat. Hist. (2), xii., 1853, p.374.

WEDNESDAY, APRIL 29TH, 1908.

The Ordinary Monthly Meeting of the Society was held in the Linnean Hall, Ithaca Road, Elizabeth Bay, on Wednesday evening, April 29th, 1908.

Mr. A. H. S. Lucas, M.A., B.Sc., President, in the Chair.

Mr. W. G. HALL, Public School, Millfield, N. S.W., and Mr. H. M. GILES, Zoological Gardens, South Perth, W.A., were elected Ordinary Members of the Society.

The President announced that, under the provisions of Rule XXV., the Council had elected Mr. HENRY DEANE, M.A. F.L.S.,&c., Mr. J. H. MAIDEN, F.L.S., &c., Dr. T. STORIE DIXSON, and Mr. THOMAS STEEL, F.C.S., F.L.S., &c., to be VICE-PRESIDENTS for the current Session.

A letter from the Department of Public Health, Sydney, embodying a request from the Natural History Branch of the British Museum for additional specimens of blood-sucking insects, was read to the Meeting. Contributions should be divided into two portions, and despatched simultaneously, one to The Director, British Museum (Natural History), and the other to The Quick Professor of Biology, New Museums, Cambridge. It was also asked that duplicates of specimens which had already been sent to the British Museum might be sent to the Quick Professor of Biology at Cambridge. The President commended the matter to the notice of Members who were in a position to respond to this deserving appeal for material which would be put to good use; and Dr. Chapman emphasised the importance of addressing contributions sent to Cambridge to "The Quick Professor of Biology."

The President said that this year (1908) would afford an opportunity for celebrating the jubilee of the Theory of Natural Selection, as propounded by Charles Darwin and Alfred Russel Wallace in 1858; and that next year would be the jubilee year of the publication of the "Origin of Species," and the centenary of Charles Darwin's birth; and he thought that the chance of signalising the occasion by sending an appropriate communication from the Society to Dr. Wallace, as the surviving veteran, should not be lost sight of.

On the motion of Professor Wilson it was resolved that the question of suitably commemorating the approaching interesting anniversaries referred to by the President be remitted to the Council for the arrangement of details.

The Donations and Exchanges received since the previous Monthly Meeting, amounting to 16 Vols., 63 Parts or Nos., 9 Bulletins, 1 Report, 20 Pamphlets, and 3 Maps, received from 16 Societies, &c., and two Individuals, were laid upon the table.

A REVISION OF THE *THYNNIDÆ* OF AUSTRALIA.

[*Hymenoptera.*]

Part II.

By Rowland E. Turner, F.E.S.

(Continued from these Proceedings, 1907, p.290.)

Subfamily **THYNINNÆ** *(continued).*

Genus Thynnus Fab.

Thynnus Fab., Syst. Ent. p.360, n.113, 1775.

The species which I retain in this genus are very diverse in appearance and structure, but I have thought it best in the present state of our knowledge to use subgenera, rather than to create an excessive number of genera, many of which might have to be sunk when further material becomes available. I have also been unable to examine the mouth-parts of several of the species which might have thrown more light on the natural arrangement.

The structure being so varied, I shall only mention the characters which serve to distinguish the genus from other Australian genera of the family.

♂. The hypopygium is always abnormal, but never in the form of a long and strongly recurved acute spine as in *Rhagigaster* and the allied genera. The head is never as strongly hollowed beneath, or as strongly bearded on the sides as in *Tachynomyia*; nor is the abdomen as strongly petiolate as in *Ariphron*. The maxillary palpi of the last two genera are also strongly elongate, which alone will distinguish them from all species of *Thynnus* except the subgenus *Zeleboria*.

♀. The maxillary palpi are rudimentary, consisting of two, or more rarely of three joints; and the second segment of the abdomen is differentiated, more or less transversely carinated.

I have been compelled to use the mouth-parts to a considerable extent in the subdivision of the genus, although I am aware of the inconvenience entailed owing to the difficulty of study without dissection, which cannot always be resorted to. But I have found that the characters used by Ashmead, the hypopygium and clypeus are far too variable to be any guide except for specific distinctions. I have thought it best to sink *Thynnoides*, though the structure of the anterior coxæ in the male and the pygidium and maxillary palpi (3-jointed) of the female may warrant its retention when more material is available.

Table of Subgenera of the Genus Thynnus Fab.

i. ♂. Labrum strongly narrowed posteriorly.

A. Joints of the antennæ strongly arcuate beneath.

a. Second recurrent nervure received by the third cubital cell at some distance from the base. Hypopygium prominent, not emarginate.

(♀. Second abdominal segment rugose, with a transverse carina at the base and at the apex. Pygidium simple).

Phymatothynnus.

b. Second recurrent nervure received very near the base of the third cubital cell. Hypopygium short and emarginate.

(♀. Second abdominal segment with one carina or more. Pygidium simple. Thorax very coarsely sculptured).

Psammothynnus Ashm.

B. Joints of the antennæ not strongly arcuate beneath.

a. Second recurrent nervure received by the third cubital cell at some distance from the base.

a^2. Abdomen flattened, the segments not constricted.

a^3. The three apical joints of the maxillary palpi elongate.

Zeleboria Sauss.

b^3. The joints of the maxillary palpi slender and subequal.

Glaphyrothynnus.

b^2. Abdomen not much flattened, the mouth-parts variable.

Lophocheilus Guér.

b. Second recurrent nervure received close to the base of the third cubital cell.

a^2. Apical joint of the maxillary palpi rudimentary.

Catocheilus Guér.

b^2. Apical joint of the maxillary palpi normal.

a^3. Labrum strongly bilobed. *Agriomyia* Guér.

b^3. Labrum not strongly bilobed, usually truncate.
Aeolothynnus Ashm.

ii. Labrum broad and full, scarcely narrowed posteriorly.

A. Antennæ slender at the apex.
(♀. Pygidium with the truncation broadly ovate; not constricted before or on the truncation). *Macrothynnus.*

B. Antennæ of almost even thickness throughout.
(♀. Pygidium constricted before or more rarely on the truncation). *Thynnus.*

Key to the Species of Thynnus.

♂ ♂. i. Labrum strongly narrowed posteriorly.

A. The joints of the antennæ strongly arcuate beneath.

a. Hypopygium not emarginate.

a^2. Hypopygium with an apical spine.

a^3. Postscutellum yellow, legs ferruginous. *aratus* 2

b^3. Wholly black. *monilicornis* Sm. 1

b^2. Hypopygium without an apical spine. *nitidus* Sm. 4

b. Hypopygium short and emarginate.

a^2. Clypeus with a carina. *depressus* Westw. 5

b^2. Clypeus without a carina. *fulvopilosus* Sm 6

B. The joints of the antennæ not strongly arcuate beneath.

a. Second recurrent nervure received by the third cubital cell at some distance from the base.

a^2. Abdomen flattened, the segments not constricted.

a^3. The three apical joints of the maxillary palpi elongate.

a^4. The second cubital cell shorter than the third on the radial nervure.

a^5. Hypopygium without an apical spine.

a^6. Antennæ short and stout. *leucostictus* 18

b^6. Antennæ slender. *ada* 12

b^5. Hypopygium with an apical spine.

a^6. Hypopygium with a strong spine on each side near the base. *agnatus* 13

b^6. Hypopygium with an apical spine only.

a^7. Hypopygium rounded at the apex.

a^8. Wholly black; the antennæ long and slender. *longicornis* 19

b^8. The sides of the abdomen spotted with white; the antennæ rather short. *sexmaculatus* Sm. 7

b^7. Hypopygium truncate at the apex.

a^8. Abdomen spotted with yellow on the sides.

a^9. Hypopygium broad, the sides almost parallel. *trivialis* Sm. 9

b^9. Hypopygium sharply narrowed near the base, narrowly truncate at the apex. *proximus* 8

b^8. Abdomen wholly black. *nitidulus* 10

c^7. Hypopygium triangular.

a^8. Abdomen black *politus* 14

b^8. Abdomen light ferruginous-red. *cryptoides* Sm. 11

b^4. The second cubital cell as long or longer than the third on the radial nervure.

a^5. Posterior femora with a large tubercle beneath.

a^6. Abdomen black. *calcaratus* Sm. 15

b^6. Second and third segments of the abdomen dark ferruginous *femoratus* 16

b^5. Posterior femora without a tubercle; the abdomen ferruginous. *volatilis* Sm. 17

b^3. The three apical joints of the maxillary palpi not elongate.

a^4. Hypopygium strongly emarginate. *xanthorrhoei* Sm. 20

b^4. Hypopygium not emarginate, blunt at the apex.

a^5. Clypeus strongly convex, truncate at the apex.

a^6. Hypopygium with a spine on each side near the base. *sitiens* 26

b^6. Hypopygium entirely without spines.

a^7. Abdomen black and yellow.

a^8. Abdomen black with yellow spots on the sides. *contiguus* 21

b^8. Abdomen black with yellow bands or lunules

a^9. The yellow bands on the abdomen broad.

a^{10}. The yellow bands interrupted in the middle. *trifidus* Westw. 23

b^{10}. The yellow bands not interrupted. *flavescens* Sm. 25

b^9. The bands on the abdomen narrow and lunulate *carinatus* Sm. 24

b^7. Abdomen black and ferruginous. *sedulus* Sm. 27

b^5. Clypeus not very strongly convex and slightly emarginate *marginalis* Westw. 22

b^2 The abdomen not much flattened, the segments often constricted.

a^3. The first dorsal segment of the abdomen without a tubercle at the base.

a^4. The hypopygium not triangular or subtriangular.

a^5. The hypopygium broadly produced from the rounded basal prominences.
a^6. Wholly black. *villosus* Guér. 106
b^6. Not wholly black.
a^7. The legs and mandibles ferruginous *fervens* Sm. 107
b^7. The legs black, the mandibles yellow. *anilitatis* Sm. 108
b^5. The hypopygium narrowly produced from the acute basal prominences, the sides parallel. *froggatti* 123
b^4. The hypopygium triangular or subtriangular, with or without basal prominences.
a^5. Wings hyaline or flavo-hyaline.
a^6. The abdominal segments strongly constricted.
a^7. Abdomen black.
a^8. Abdomen wholly black. *obscurus* Klug. 121
b^8. The two apical abdominal segments red. *mamillatus* 109
b^7. Abdomen ferruginous.
a^8. The ventral segments without tubercles. *petulans* Sm. 118
b^8. Some of the ventral segments with tubercles at the sides.
a^9. Segments 3-5 with tubercles. *wieseri* D.T. 117
b^9. Segments 3-4 with tubercles. *excoriatus* 116
b^6. The abdominal segments not at all or very slightly constricted.
a^7. Abdomen black, without markings.
a^8. Hypopygium unarmed. *tenuatus* Sm. 111
b^8. Hypopygium armed.
a^9. Clypeus with a medium carina, wholly black *ambiguus* 110
b^9. Clypeus without a carina, margined with yellow.
a^{10}. Legs fusco-ferruginous *protervus* Sm. 119
b^{10}. Legs black *kirbyi* 124
b^7. Abdomen marked with yellow.
a^8. Abdomen elongate or fusiform.
a^9. Second ventral segment of the abdomen with a tubercle on each side. *tuberculiventris* Westw. 125
b^9. The ventral segments without tubercles.

a^{10}. Hypopygium elongate-triangular.
a^{11}. Abdomen black with yellow spots on the sides.
a^{12}. Antennæ moderately long.
a^{13}. The anterior angles of the pronotum prominent. *crinitus* 126
b^{13}. The anterior angles of the pronotum not prominent. *immodestus* 130
b^{12}. Antennæ short.
a^{13}. First abdominal segment short.
a^{14}. The spots on the abdomen small *vigilans* Sm. 112
b^{14}. The spots enlarged, forming interrupted bands. *vigilans* Sm. var. *incertus* 112
b^{13}. First abdominal segment long and slender. *cognatus* Sm. 113
b^{11}. Abdomen ferruginous marked with orange.
a^{12}. The posterior margin of the pronotum fulvous.
a^{13}. The clypeus longer than broad. *rufiventris* Guér. 127
b^{13}. The clypeus broader than long. *wallisii* Sm. 128
b^{12}. The pronotum entirely black. *inconstans* Sm. 133
b^{10}. Hypopygium short and broad.
a^{11}. The yellow bands on the abdomen interrupted *senex* Sm. 131
b^{11}. The bands orange and not interrupted. *flavipennis* Sm. 134
b^{8}. Abdomen subconical, truncate at the base.
a^{9}. Clypeus truncate at the apex.
a^{10}. Median segment marked with yellow.
a^{11}. Pronotum black. *hyalinatus* Westw. 137
b^{11}. Pronotum marked with yellow. *apterus* Oliv. 136
b^{10}. Median segment black. *maculosus* Sm. 138
b^{9}. Clypeus strongly rounded at the apex.
a^{10}. Hypopygium not truucate at the apex. *affinis* Guér. 140

b^{10}. Hypopygium truncate, the apical spine recurved. *annulatus* Kirby 139

b^{5}. Wings dark fuscous.

a^{6}. With a spine on each side of the sixth ventral abdominal segment. *purpureipennis* Westw. 115

b^{6}. Without a spine on the sixth ventral segment. *lubricus*. 114

b^{3}. The first dorsal segment of the abdomen with a tubercle at the base. *oppositus* Sm. 135

b. The second recurrent nervure received by the third cubital cell close to the base.

a^{2}. The sixth joint of the maxillary palpi rudimentary. *klugii* Guér. 105

b^{2}. The sixth joint of the maxillary palpi normal.

a^{3}. The labrum long and narrow, very strongly bilobed.

a^{4}. First ventral segment of the abdomen with an acute tubercle.

a^{5}. Hypopygium rounded at the apex, with a short spine.

a^{6}. The second dorsal segment of the abdomen with a transverse depressed line at the base.

a^{7}. The median segment rounded at the sides.

a^{8}. The anterior margin of the pronotum yellow.

a^{9}. Abdomen black, marked with yellow or white.

a^{10}. Abdomen sparsely punctured.

a^{11}. Pronotum yellow with a black spot in the middle and on each side. *albomaculatus* Sm. 95

b^{11}. Anterior margin only of the pronotum yellow.

a^{12}. Front smooth and shining. *rotundiceps* Sm. 89

b^{12}. Front punctured.

a^{13}. Median segment black. *rotundiceps* Sm. var. *propinquus* Sm. 89

b^{13}. Median segment marked with white. *cingulatus*. 90

b^{10}. Abdomen closely punctured or rugulose.

a^{11}. The sixth abdominal segment with a yellow spot on each side. *jucundus* Sm. 87

b^{11}. The sixth abdominal segment wholly black.

a^{12}. Thorax marked with yellow.
a^{13}. Scutellum marked with yellow.
a^{14}. Median segment marked with yellow on the middle and on the sides. *maculatus* Guér. 85
b^{14}. Median segment marked with yellow on the sides only.
a^{15}. Head massive and rounded. *medius* Sm. 88
b^{15}. Head not very massive.
a^{16}. With a yellow spot on the vertex. *maculatus* Guér. var. *odyneroides* Westw. 85
b^{16}. Without a yellow spot on the vertex. *vividus* Sm. 86
b^{13}. Scutellum not marked with yellow. *maculatus* Guêr. var. *variegatus* Klug. 85
b^{12}. Thorax and median segment black, postscutellum white.
a^{13}. Legs black. *luctuosus* Sm. 92
b^{13}. Legs ferruginous. *marginilabris* Guér. 91
b^{9}. Abdomen dark ferruginous, marked with white. *rubellus* Sm. 93
b^{8}. Anterior margin of the pronotum black.
a^{9}. Abdominal segments 2-4 with a yellow spot on each side. *molestus* Sm. 94
b^{9}. Abdomen wholly black. *adelaidæ*. 98
b^{7}. The median segment subtruncate. *suspiciosus* Sm. 96
b^{6}. Second dorsal segment of the abdomen not depressed at the base. *trochanterinus* Westw. 99
b^{5}. Hypopygium triangular with a short apical spine. *albopictus* Sm. 97
b^{4}. The tubercle on the first ventral segment not developed.
a^{5}. Abdomen black and yellow. *irregularis* Sm. 100
b^{5}. Abdomen black with the two apical segments red. *incensus* Sm. 102
b^{3}. The labrum not bilobed or very slightly so, usually short and subtriangular.
a^{4}. Abdomen flattened, the segments not constricted.
a^{5}. Hypopygium without an apical spine.
a^{6}. Abdomen black and yellow. *pygmaeus*. 34
b^{6}. Abdomen marked with ferruginous.

a^7. Mesonotum and median segment marked with yellow. *rubromaculatus*. 35

b^7. Mesonotum and median segment black.

a^8. Abdomen not marked with yellow, the four basal segments ferruginous. *innocuus*. 36

b^8. Abdomen with yellow spots on the sides, the second segment only marked with ferruginous. *planiventris*. 40

b^5. Hypopygium with an apical spine.

a^6. Hypopygium rounded or triangular. Abdomen black and yellow.

a^7. Hypopygium triangular. *beatrix*. 39

b^7. Hypopygium rounded. *penetratus* Sm. 38

b^6. Hypopygium truncate at the apex.

a^7. Abdomen black, usually marked with yellow or white.

a^8. Thorax wholly black, the legs ferruginous. *generosus*. 37

b^8. Thorax marked with yellow, the legs black.

a^9. Wings wholly hyaline. *westwoodi* Guér. 28

b^9. Wings hyaline with a fuscous cloud in the radial cell. *mackayensis*. 43

b^7. Abdomen more or less ferruginous.

a^8. Abdomen ferruginous except at the extreme base.

a^9. Front without a longitudinal sulcus. *decoratus* Sm. 41

b^9. Front with a well marked longitudinal sulcus. *sodalis*. 42

b^8. The apical segments of the abdomen black.

a^9. Abdomen without yellow lunules. *tenuis*. 33

b^9. Abdomen marked with yellow lunules or spots.

a^{10}. Abdomen marked with lunules.

a^{11}. Without a median frontal sulcus. *pulchellus* Klug. 29

b^{11}. With a median frontal sulcus. *pulcherrimus*. 30

b^{10}. Abdomen with yellow spots on the sides. *minutus* Sm. 32

b⁴. Abdomen not much flattened, the segments more or less constricted.

a^5. Without spines on the sides of the fifth or sixth ventral segments.
a^6. Hypopygium rounded or truncate, with a single spine.
a^7. Hypopygium rounded at the apex.
a^8. Abdomen black and yellow.
a^9. Abdomen broadly banded with yellow. *polybioides*. 44
b^9. Abdomen marked with yellow on the sides only. *rostratus*. 58
b^8. Abdomen ferruginous marked with white. *combustus* Sm. 60
b^7. Hypopygium truncate at the apex.
a^8. Hypopygium narrowly truncate; abdomen yellow and ferruginous. *optimus* Sm. 45
b^8. Hypopygium broadly truncate; abdomen almost entirely black.
a^9. Abdomen marked with yellow on the sides. *dispersus*. 56
b^9. Abdomen entirely black.
a^{10}. The sides of the epipygium dilated near the apex. *zelebori* Sauss. 53
b^{10}. The epipygium truncate, the sides not dilated.
a^{11}. The scutellum narrowly truncate at the apex. *truncatus* Sm. 54
b^{11}. The scutellum broadly truncate at the apex.
a^{12}. Legs black. *iridipennis* Sm. 55
b^{12}. Legs ferruginous. *collaris* Guér. 57
b^6. Hypopygium tridentate, the apical spine much the longest.
a^7. Clypeus rostrate. *arenicolus*. 59
b^7. Clypeus not rostrate.
a^8. Scutellum not strongly elevated in the middle.
a^9. Abdomen slender, the segments not strongly constricted, black or black and yellow.
a^{10}. Abdomen banded with yellow.
a^{11}. The yellow bands not interrupted. *jardinei*. 47
b^{11}. The yellow bands interrupted.

a^{12}. The disc of the mesonotum and scutellum ferruginous. *bembeculus.* 48

b^{12}. The disc of the mesonotum and scutellum black marked with yellow.

a^{13}. Legs light ferruginous.

a^{14}. Scutellum rounded at the apex. *productus.* 49

b^{14}. Scutellum narrowly truncate at the apex. *coloratus.* 50

b^{13}. Legs black and fusco-ferruginous.

a^{14}. Scutellum narrowly truncate at the apex. *conjungens.* 52

b^{14}. Scutellum broadly truncate at the apex. *tasmaniensis* Sauss. 51

b^{10}. Abdomen wholly black. *pavidus* Sm. 61

b^{9}. Abdomen broad, the segments strongly constricted, ferruginous. *gilberti.* 82

b^{8}. Scutellum strongly elevated in the middle.

a^{9}. Abdomen elongate-fusiform, black and yellow.

a^{10}. Abdomen punctured.

a^{11}. Legs ferruginous. *cygnorum.* 67

b^{11}. Legs black and yellow. *bipartitus.* 66

b^{10}. Abdomen finely rugose.

a^{11}. First two abdominal segments shining. *crabroniformis* Sm. 65

b^{11}. Second abdominal segment finely rugose. *crabroniformis* Sm. var. *opaciventris* 65

b^{9}. Abdomen elongate, ferruginous marked with white.

a^{10}. Interantennal prominence not developed. *excellens* Sm. 62

b^{10}. Interantennal prominence broadly V-shaped. *excelsus.* 63

b^{5}. With a spine at the apical angles of the fifth or sixth ventral segment.

a^{6}. The spine on the sixth segment and not on the fifth.

a^{7}. Clypeus rostrate. *eyrensis.* 73

b^{7}. Clypeus not rostrate.

a^8. Abdomen elongate, clypeus not very narrow at the apex.
a^9. Median segment subtruncate.
a^{10}. Thorax coarsely punctured. *sanguinolentus* 79
b^{10}. Thorax finely punctured. *baccatus* Sm. 74
b^9. Median segment rounded.
a^{10}. Abdomen wholly or partly ferruginous.
a^{11}. Abdomen wholly ferruginous. *dimidiatus* Westw. 64
b^{11}. The two apical segments only ferruginous-red.
a^{12}. Abdomen without white marks. *decipiens* Westw. 78
b^{12}. Abdomen marked with white. *illustris* Kirby 75
b^{10}. Abdomen black or black and yellow.
a^{11}. Abdomen marked with yellow.
a^{12}. Median segment coarsely punctured. *cerceroides* Sm. 77
b^{12}. Median segment finely punctured. *ablatus* 76
b^{11}. Abdomen entirely black.
a^{12}. Wings hyaline. *armiger* 80
b^{12}. Wings fuscous. *umbripennis* Sm. 81
b^8. Abdomen broadly fusiform, clypeus narrow at the apex
a^9. Abdomen black. *aterrimus* Sm. 83
b^9. Abdomen marked with creamy yellow. *saundersi* 84
b^6. The fifth ventral segment with a long spine at the apical angles.
a^7. Abdomen elongate fusiform. *clementi* 72
b^7. Abdomen elongate.
a^8. Without a spine at the angles of the sixth ventral segment.
a^9. Head black.
a^{10}. Clypeus yellow and black. *bidentatus* Sm. 70
b^{10}. Clypeus wholly black. *bidentatus* Sm. var. *orientalis* 70
b^9. Head yellow, the vertex only black *doddii* 71
b^8. With a small spine at the apical angles of the sixth segment. *sannæ* 69

ii. Labrum broad and full, scarcely narrowed at the base.
A. The two or three apical joints of the antennæ not nearly as thick as the others.
a. The hypopygium ending in a very blunt, strongly recurved process.
a^2. The clypeus fulvous and truncate at the apex. *friederici* D.T. 143
b^2. The clypeus black and broadly emarginate at the apex. *poultoni* 144
b. Hypopygium broadly rounded at the apex.
a^2. Wings flavo-hyaline; pronotum fulvous. *insignis* Sm. 142
b^2. Wings fuscous; pronotum black. *similimus* Sm. 141
B. The antennæ of almost equal thickness throughout.
a. Sixth ventral segment of the abdomen with a spine at the apical angles.
a^2. Median segment vertically truncate posteriorly.
a^3. Scutellum and postscutellum produced beyond the median segment.
a^4. Postscutellum very strongly emarginate at the apex. *emarginatus* Fab. 149
b^4. Postscutellum not strongly emarginate.
a^5. Head and thorax entirely pale yellow. *ventralis* Sm. 148
b^5. Thorax marked with black above or beneath.
a^6. Black and pale yellow *dentatus* Fab. 146
b^6. Black and bright ferruginous brown. *pulchralis* Sm. 147
b^3. Postscutellum reaching the truncation of the median segment, but not projecting beyond it.
a^4. Abdomen marked with pale yellow above. *darwiniensis* 153
b^4. Abdomen wholly black above.
a^5. Scutellum with a tubercle at the apex; the wings hyaline. *brenchleyi* Sm. 151
b^5. Scutellum without a tubercle; the wings fuscous. *ochrocephalus* Sm. 152
b^2. Median segment obliquely truncate or rounded posteriorly.
a^3. Median segment obliquely truncate.
a^4. Hypopygium with five spines.
a^5. Legs yellow. *zonatus* Guér. 154
b^5. Legs ferruginous. *elgneri* 155
b^4. Hypopygium with three spines or less
a^5. The truncation of the median segment slightly concave. *excavatus* 166
b^5. The truncation of the median segment not concave.

a^6. Abdomen black.
a^7. Wings dark fuscous, hyaline at the base.
fenestratus Sm. 167
b^7. Wings fusco-hyaline. *morosus* Sm. 168
b^6. Abdomen barred with yellow.
a^7. Clypeus not depressed.
a^8. The yellow bands on the abdomen broad.
a^9. The basal spines of the hypopygium prominent *vernalis* 159
b^9. The basal spines of the hypopygium not prominent. *anchorites* 160
b^8. The yellow bands on the abdomen narrow.
a^9. Mesonotum marked with yellow.
leachiellus Westw. 158
b^9. Mesonotum without yellow marks.
campanularis Sm. 161
b^7. Clypeus depressed. *andreanus* 187
b^3. Median segment more or less rounded.
a^4. Clypeus not very prominent at the base.
a^5. Abdomen marked with yellow. *vestitus* Sm. 157
b^5. Abdomen not marked with yellow.
a^6. Hypopygium tridentate; abdomen black.
a^7. Clypeus yellow. *walkeri* 192
b^7. Wholly black. *nigripes* Guér. 194
b^6. Hypopygium without basal spines, unidentate; the apical abdominal segment red. *crudelis* 196
b^4. Clypeus very prominent at the base.
a^5. Abdomen marked with yellow. *simplex* Sm. 195
b^5. Abdomen wholly black.
a^6. Clypeus black.
a^7. Entirely black; hypopygium without an apical spine. *atrox* 193
b^7. Black, the legs ferruginous; hypopygium with an apical spine. *novaræ* Sauss. 190
b^6. Clypeus yellow.
a^7. Legs black. *carbonarius* Sm. 188
b^7. Legs ferruginous. *pseustes* 191
b. Sixth ventral segment of the abdomen without a spine at the apical angles.
a^2. Abdomen subconical or elongate.
a^3. Median segment truncate.
a^4. Abdomen black beneath.
a^5. Abdomen wholly black.

a^6. Abdomen punctured, without pubescence.
flavilabris Guér. 169
b^6. Abdomen very finely punctured, with fine pubescence. *picipes* Westw. 170
b^5. Abdomen not wholly black.
a^6. All the dorsal segments of the abdomen orange-brown.
a^7. Wings flavo-hyaline.
a^8. Median segment with golden pile.
shuckardi Guér. 172
b^8. Median segment with white pile.
guerinii Westw. 173
b^7. Wings fuscous. *obscuripennis* Guér. 171
b^6. Two or more apical abdominal segments black.
a^7. Abdomen orange-brown above, the two apical segments black. *flaviventris* Guér. 174
b^7. Abdomen black, banded with yellow or obscure ferruginous on the four or five basal segments.
varipes Sm. 175
b^4. Abdomen marked with yellow above and beneath.
a^5. Thorax entirely black. *seductor* Sm. 164
b^5. Thorax marked with yellow.
a^6. Epipygium punctured. *confusus* Sm. 162
b^6. Epipygium striated. *flavopictus* Sm. 176
b^3. Median segment rounded at the sides.
a^4. Hypopygium rather broadly truncate at the apex, with a spine.
a^5. Abdomen sparsely punctured, broadly banded with yellow. *subinterruptus* Sm. 184
b^5. Abdomen closely punctured, narrowly banded with yellow. *frenchi* 180
b^4. Hypopygium triangular from near the base, with a short spine or none.
a^5. Abdomen banded with yellow.
a^6. Hypopygium without an apical spine.
assimilis Sm. 179
b^6. Hypopygium with an apical spine.
a^7. Median segment wholly black.
a^8. The yellow bands on the abdomen interrupted. *agilis* Sm. 178
b^8. The yellow bands on the abdomen not interrupted. *insidiator* Sm. 182
b^7. Median segment marked with yellow.

a^8. Median segment oblique. *melleus* Westw. 181
b^8. Median segment abruptly truncate. *irritans* Sm. 183
b^5. Abdomen not banded with yellow.
a^6. Abdomen ferruginous red. *basalis* Sm. 185
b^6. Abdomen black. *tuberculifrons* Sm. 186
b^2. Abdomen fusiform or elongate-fusiform.
a^3. Clypeus not emarginate at the apex.
a^4. First ventral segment of the abdomen with a tubercle at the apex.
a^5. Abdomen black, with a broad yellow band on the fourth segment. *unifasciatus* Sm. 201
b^5. Abdomen wholly black.
a^6. Abdominal segments margined with white pubescence. *impetuosus* Sm. 202
b^6. Abdomen without pubescence. *waterhousei*. 205
b^4. First ventral abdominal segment without a tubercle at the apex.
a^5. Second ventral segment of the abdomen with a tubercle at the base. *melanotus*. 203
b^6. Second ventral segment without a tubercle.
a^7. Abdomen with broadly interrupted orange bands.
a^8. The abdominal segments strongly constricted. *constrictus* Sm. 200
b^8. The abdominal segments not much constricted.
a^9. Median segment and scutellum black. *modestus* Sm. 199
b^9. Median segment and scutellum marked with orange.
a^{10}. Pronotum marked with orange on the anterior margin only. *frauenfeldianus* Sauss. 198
b^{10}. Posterior margin of the pronotum broadly marked with orange. *nubilipennis* Sm. 197
b^7. Abdomen wholly black or black and ferruginous brown.
a^8. Clypeus black; abdomen elongate-fusiform. *moechus*. 189
b^8. Clypeus yellow or margined with white at the sides.

a^9. Clypeus yellow, the abdomen broadly fusiform.
a^{10}. Abdomen black. *binghami.* 204
b^{10}. Abdominal segments margined with dull ferruginous-brown. *ultimus.* 206
b^9. Clypeus margined with white at the sides; abdomen elongate-fusiform.
a^{10}. Mesopleuræ red. *pugionatus* Guér. 210
b^{10}. Mesopleuræ black. *gracilis* Westw. 211
b^3. Clypeus emarginate at the apex.
a^4. Legs ferruginous; wings flavohyaline.
a^5. Abdomen sparsely punctured. *fulvipes* Guér. 207
b^5. Abdomen closely punctured. *fumipennis* Westw. 208
b^4. Legs black; wings hyaline. *senilis* Erichs. 209

♀ ♀. i. Fifth ventral segment punctured.
A. Tarsal ungues bifid.
a. Second dorsal segment of the abdomen with less than four transverse carinæ.
a^2. Thorax punctured; the second dorsal segment of the abdomen rugose with a transverse carina at the base and at the apex.
a^3. Head strongly rounded at the posterior angles. *aratus.* 2
b^3. Head almost rectangular. *monilicornis* Sm. 1
b^2. Thorax coarsely rugose.
a^3. Pronotum without a carina. *depressus* Westw. 5
b^3. Pronotum with a median carina. *fulvopilosus* Sm. 6
b. Second dorsal segment of the abdomen with four or more transverse carinæ.
a^2. Pronotum without a carina.
a^3. Pygidium not contracted.
a^4. Head about as long as broad. *cryptoides* Sm. 11
b^4. Head broader than long.
a^5. Head rounded at the sides. *trivialis* Sm. 9
b^5. Head not rounded at the sides. *nitidulus.* 10
b^3. Pygidium contracted.
a^4. Second dorsal segment of the abdomen with six transverse carinæ. *proximus.* 8
b^4. Second dorsal segment of the abdomen with less than six transverse carinæ.
a^5. Head large and convex. *attenuatus* Sm. 103
b^5. Head flattened.
a^6. Pronotum with a median sulcus on the anterior portion.

a^7. Head narrowed posteriorly.
a^8. Pronotum broader than long. *maculatus* Guér. 85
b^8. Pronotum longer than broad. *laevifrons* Sm. 101
b^7. Head broad and rounded. *luctuosus* Sm.
b^6. Pronotum without a sulcus.
a^7. Head strongly narrowed posteriorly.
medius Sm. 88
b^7. Head broad and rounded. *rotundiceps* Sm. 89
b^2. Pronotum with a median carina. *sannæ*. 69
B. Tarsal ungues simple.
a. Epipygium not contracted.
a^2. Pygidium not truncate.
a^3. Anterior angles of the pronotum tuberculate.
politus. 14
b^3. Anterior angles of the pronotum not tuberculate.
femoratus. 16
b^2, Pygidium vertically truncate.
a^3. Pygidium half as long again as broad. *xanthorrhoei* Sm. 20
b^3. Pygidium more than twice as long as broad.
marginalis Westw. 22
b. Epipygium contracted.
a^2 Epipygium recurved at the apex.
a^3. Pronotum slightly raised in the middle of the anterior margin. *flavescens* Sm. 25
b^3. Pronotum not raised on the anterior margin.
carinatus Sm. 24
b^2. Epipygium not recurved at the apex.
a^3. Pronotum without a carina or tubercle.
a^4. Pronotum as long as broad.
a^5. Pronotum with a deep median sulcus on the anterior margin. *westwoodi* Guér. 28
b^5. Pronotum without a sulcus.
a^6. Median segment strongly punctured. *beatrix*. 39
b^6. Median segment almost smooth; the angles of the pronotum prominent.
a^7. Head strongly narrowed posteriorly.
pulcherrimus 30
b^7. Head rounded. *generosus* 37
b^4. Pronotum much broader than long.
a^5. The raised carina before the apex of the first abdominal segment not emarginate.
a^6. Pronotum not flattened.
a^7. Pronotum with a median sulcus on the anterior margin.

a^8. Head strongly convex. *puchellus* Klug. 29
b^8. Head flattened. *mackayensis* 43
b^7. Pronotum without a sulcus.
a^8. Head not narrowed posteriorly. *pavidus* Sm. 61
b^8. Head narrowed posteriorly. *armiger* 80
b^6. Pronotum flattened.
a^7. Head strongly excavated on each side. *sulcatus* Sm. 46
b^7. Head not excavated.
a^8. Head narrowed posteriorly. *gilberti* 82
b^8. Head not narrowed posteriorly.
a^9. Pronotum emarginate. *adelaidæ*
b^9. Pronotum not emarginate. *iridipennis* Sm. 55
b^5. The raised carina before the apex of the first abdominal segment emarginate.
a^6. Pronotum narrowed posteriorly. *ablatus* 76
b^6. Pronotum not narrowed posteriorly.
a^7. Head convex, narrowed anteriorly. *sanguinolentus* 79
b^7. Head flattened, narrowed posteriorly. *cerceroides* Sm. 77
b^3. Pronotum with a median carina or tubercle.
a^4. Head rounded at the sides.
a^5. Head broad and flat.
a^6. Pronotum narrowed posteriorly. *crabroniformis* Sm. var. *opaciventris* 65
b^6. Pronotum not narrowed posteriorly. *coloratus* 50
b^5. Head narrowed into a neck posteriorly. *doddii* 71
b^4. Head not rounded at the sides.
a^5. Head broader than long. *quadratus* Sm. 68
b^5. Head longer than broad.
a^6. Head strongly narrowed posteriorly. *bipartitus* 66
b^6. Head not narrowed posteriorly.
a^7. Head excavated on the sides. *zelebori* Sauss. 53
b^7. Head not excavated on the sides.
a^8. Pronotum broader than long. *tasmaniensis* Sauss. 51
b^8. Pronotum longer than broad. *conjungens* 52

ii. Fifth ventral segment striated or rugose.
A. Pygidium not sharply contracted before the truncation or on the truncation.
a. Pygidium very narrow, the sides parallel. *villosus* Guér. 106
b. Pygidium broader, usually longitudinally striated.
a^2. Pygidium not notched at the sides before the apex.

a^3. Pygidium longer than broad, the sides parallel or nearly so.
a^4. First abdominal segment obliquely striated.
lubricus 114
b^4. First abdominal segment without oblique striae.
a^5. Fifth ventral segment rugose.
a^6. Epipygium slightly widened to the apex and broadly truncate. *purpureipennis* Westw. 115
b^6. Epipygium not widened to the apex.
a^7. Legs bright ferruginous.
a^8. Head ferruginous. *vigilans* Sm. 112
b^8. Head black. *froggatti* 123
b^7. Legs fusco-ferruginous.
a^8. Head opaque and delicately punctured.
obscurus Klug. 121
b^8. Head shining and almost smooth.
laeviceps Sm. 122
b^5. Fifth ventral segment longitudinally striated.
a^6. Abdomen black. *ambiguus* 110
b^6. Abdomen marked with yellow.
a^7. Pygidium narrowed to the apex. *excoriatus* 116
b^7. Pygidium not narrowed to the apex.
a^8. Second abdominal segment wholly yellow.
inconstans Sm. 133
b^8. Second abdominal segment spotted with yellow.
a^9. Second abdominal segment ferruginous.
immodestus 130
b^9. Second abdominal segment black.
klugii Guér. 105
b^3. Pygidium ovate.
a^4. Second abdominal segment transversely rugose-striate. *friederici* D.T. 143
b^4. Second abdominal segment with transverse carinae.
a^5. The whole of the first dorsal segment of the abdomen transversely striated. *dilatatus* Sm. 145
b^5. The first abdominal segment not striated on its whole length.
a^6. The first abdominal segment transversely striated at the apex. *simillimus* Sm. 141
b^6. The first abdominal segment not striated.
insignis Sm. 142
b^2. Pygidium notched on each side near the apex, the sides produced into short spines.

a^3. Clypeus not pointed.
a^4. Head black.
a^5. Front of the head yellow; the thorax ferruginous. *flavifrons* Sm. 120
b^5. Head and thorax entirely black. *protervus* Sm. 119
b^4. Head ferruginous.
a^5. Pronotum black. *connectens* Sm. 132
b^5. Pronotum ferruginous. *flavipennis* Sm. 134
b^3. Clypeus pointed.
a^4. Fifth ventral segment rugose.
a^5. The spines on the sides of the pygidium very small. *rufiventris* Guér. 127
b^5. The spines on the sides of the pygidium well developed. *crinitus*. 126
b^4. Fifth ventral segment of the abdomen striated.
a^5. Head rather small, strongly rounded at the posterior angles. *kirbyi* 124
b^5. Head large, less strongly rounded posteriorly.
a^6. Abdomen almost entirely yellow, with a few black marks.
a^7. Median segment black. *wallisii* Sm. 128
b^7. Median segment yellow or ferruginous. *annulatus* Kirby 139
b^6. Abdomen black or fusco-ferruginous, marked with yellow. *apterus* Oliv. 136

B. Pygidium contracted either at the base of the truncation or near the middle of the truncation.
a. Pygidium narrow, constricted on the truncation before the apex.
a^2. Front depressed and slightly concave on each side. *ultimus* 206
b^2. Front without depressions.
a^3. Second abdominal segment with five transverse carinæ; head broader than long.
a^4. Legs black. *waterhousei* 205
b^4. Legs ferruginous.
a^5. Head black. *fumipennis* Westw. 208
b^5. Head ferruginous. *fulvipes* Guér. 207
b^3. Second abdominal segment with six carinæ; head as long as broad.
a^4. Abdomen sparsely and rather deeply punctured. *gracilis* Westw. 211
b^4. Abdomen sparsely and finely punctured. *pugionatus* Guér. 210

b. Pygidium constricted at the base of the truncation.
  a^2. Second abdominal segment with less than seven transverse carinæ.
    a^3. Pygidium widened to the apex.
      a^4. Second abdominal segment with six carinæ.
nubilipennis Sm. 197
      b^4. Second abdominal segment with five carinæ.
frauenfeldianus Sauss. 198
    b^3. Pygidium scarcely, if at all, widened to the apex.
      a^4. Second abdominal segment with five carinæ.
irritans Sm. 183
      b^4. Second abdominal segment with three or four carinæ near the base, the apical area delicately transversely striated.
        a^5. Pygidium lanceolate.
          a^6. Pronotum with a faint median carina.
tuberculifrons Sm. 186
          b^6. Pronotum without a carina.
            a^7. Head nearly rectangular, as long as broad.
insidiator Sm. 182
            b^7. Head broader than long.
              a^8. Head nearly rectangular. *basalis* Sm. 185
              b^8. Head considerably narrowed posteriorly.
melleus Westw. 181
        b^5. Pygidium elongate-ovate.
          a^6. Fifth ventral segment longitudinally striated.
flavofasciatus Sm. 177
          b^6. Fifth ventral segment of the abdomen rugose.
flavopictus Sm. 176
  b^2. Second abdominal segment with seven or more transverse carinæ.
    a^3. First abdominal segment with oblique striæ.
      a^4. Head not excavated on the front; black and yellow.
andreanus 187
      b^4. Head excavated on each side; wholly black.
        a^5. The carinæ on the second abdominal segment straight. *carbonarius* Sm. 188
        b^5. The carinæ at the base of the second segment strongly arched. *moechus* 189
    b^3. First abdominal segment without oblique striæ.
      a^4. Epipygium expanding into lobes at the apex.
        a^5. The epipygium pointed, the lobes not membranous *pseustes* 191

b^5. Epipygium truncate, the lobes membranous.
a^6. Head deeply excavated on the sides. *sulcifrons* Sm. 163
b^6. Head not excavated.
a^7. First abdominal segment with several strong transverse carinæ. *fenestratus* Sm. 167
b^7. First abdominal segment with one or two carinæ only close to the apex.
a^8. Fifth ventral segment transversely rugose. *shuckardi* Guér. 172
b^8. Fifth ventral segment longitudinally rugose. *guerinii* Westw. 173
b^4. Epipygium without lobes at the apex.
a^5. The head excavated in front on each side.
a^6. The concave spaces extending to the vertex. *leachiellus* Westw. 158
b^6. The concave spaces not extending to the vertex.
a^7. The median segment and the first abdominal segment covered with long pubescence. *brenchleyi* Sm. 151
b^7. A tuft of long hairs in the middle of the first abdominal segment.
a^8. The truncation of the pygidium ovate. *ventralis* Sm. 148
b^8. The truncation of the pygidium lanceolate ovate.
a^9. The second abdominal segment with nine or ten rather low and slightly irregular carinæ. *dentatus* Fab. 146
b^9. The second abdominal segment with eight or nine strong and regular carinæ. *pulchralis* Sm. 147
b^5. The head not excavated.
a^6. The front flattened and subconcave. *sabulosus* 156
b^6. The front convex.
a^7. Fifth ventral segment of the abdomen longitudinally striated.
a^8. The truncation of the pygidium ovate.
a^9. The anterior margin of the pronotum straight.
a^{10}. Pronotum and abdomen marked with yellow.
a^{11}. Head black; pronotum slightly concave. *excavatus* 166

b^{11}. Head yellow in front; pronotum not concave.	*vernalis*	159
b^{10}. Pronotum ferruginous-red, abdomen black.	*picticollis*	165
b^{9}. Pronotum broadly emarginate anteriorly.	*novarce* Sauss.	190
b^{8}. The truncation of the pygidium not ovate, widened to the apex.	*modestus* Sm.	199
b^{7}. Fifth ventral segment of the abdomen transversely rugose.	*seductor* Sm.	164

Subgenus i. PHYMATOTHYNNUS, n.subgen.

♂. Antennæ about as long as the head, thorax and median segment combined, the six or seven apical joints strongly arcuate beneath. Clypeus narrowly produced and truncate at the apex; labrum very small and short, truncate and strongly ciliated anteriorly, strongly narrowed posteriorly; first joint of the maxillary palpi very short, the three apical joints rather slender, fourth joint the longest; first joint of the labial palpi nearly as long as the three apical joints combined, and the labium has a few long recurved hairs at the apex. Abdominal segments depressed at the base and the hypopygium prominent.

♀. Head only slightly convex. The second abdominal segment has a transverse carina near the base and another at the apex; the intervening space transversely rugose; fifth ventral segment punctured. Pygidium simple, not contracted or truncate. Tarsal ungues bidentate; the basal joint of the anterior tarsi not produced at the apex.

Type *Thynnus monilicornis* Sm.

The mouth-parts of the male closely resemble those of *Lophocheilus villosus* Guér., from which the antennæ separate it. The female is quite different and shows some resemblance to *Tachynomyia*.

1. T. (PHYMATOTHYNNUS) MONILICORNIS Sm.

Thynnus (*Agriomyia*) *monilicornis* Sm., Cat. Hym. B.M. vii. p.39, n.104, 1859(♂♀).

♂. Clypeus short, narrowly produced and truncate anteriorly, with a small tubercle before the apex; the interantennal carina

transverse, narrowly emarginate anteriorly. Head and thorax closely punctured; the scutellum rather long, broadly rounded at the apex. Median segment rounded, very finely and shallowly punctured. Abdomen elongate-fusiform, shining, closely and very shallowly punctured; the apical margins of the segments depressed, with a raised mark on each side before the apex. Hypopygium small, much narrower at the base than at the apex, where it is truncate, with a small spine. Length 11-12 mm.

♀. Head broader anteriorly than long, narrowed posteriorly, sparsely punctured, the front produced into two minute tubercles between the antennæ. Thorax and median segment rather sparsely punctured; the pronotum much longer than broad; the median segment obliquely truncate posteriorly. First abdominal segment truncate anteriorly, sparsely punctured; the second segment with a transverse carina near the base and another near the apex, the intervening space coarsely transversely rugose, the apical margin raised, forming a third carina; the third segment with a transverse impressed line near the base, very finely punctured at the base, more coarsely and sparsely at the apex; the remaining segments finely punctured. Pygidium simple, with a low, longitudinal carina. Length 6-9 mm.

Hab.—Melbourne (French); Tasmania (Simson; ♂♀ in cop.); Bombala, N. S.W. (Froggatt; ♂♀ in cop.).

Smith's types, which are lost, were smaller. The female from Tasmania is coloured as in Smith's description, but the specimen from Bombala is much darker, the head and thorax being black; it is also more deeply punctured, but I do not think the differences are of specific value, though they may prove to be so when a longer series is available for comparison.

2. T. (Phymatothynnus) aratus, n.sp.

♂. Clypeus finely rugulose, narrowly truncate at the apex; the antennæ longer than the head and thorax, the seven apical joints depressed at the base and apex beneath and subarcuate. Head and thorax closely and finely punctured; the median segment rounded, very finely rugulose. Abdomen sparsely and shallowly

punctured, fusiform; first segment with a sulcus from the base not reaching the apex; segments 2-5 strongly depressed at the base, the apical margin narrowly depressed, with a raised mark before the apex, faint in the middle and emarginate. Hypopygium with parallel sides, triangular at the apex, with a very short spine. Black, with thin cinereous pubescence; mandibles except at apex, apex of clypeus, two small spots between the antennæ, a narrow interrupted line on the anterior margin of pronotum and postscutellum yellow; tibiæ and tarsi, and femora at the apex ferruginous. Wings fusco-hyaline, nervures black. Length 17 mm.

♀. Head much broader than long, rounded at the posterior angles, closely punctured, a short longitudinal sulcus on the front which is produced on each side of it between the antennæ into a small tubercle; clypeus with a carina from the base to the apex. Thorax and median segment punctured; pronotum rectangular broader than long; median segment obliquely truncate posteriorly, the surface of the truncation very minutely and closely punctured. Abdomen punctured, most closely on the fourth and fifth segments; second segment with a transverse carina near the base and the apical margin raised, the intervening space coarsely, transversely rugose. Fifth ventral segment strongly punctured. Pygidium simple, rugose, with a low longitudinal carina. Black; the antennæ, the legs and the apex of the pygidium ferruginous. Length 10 mm.

Hab.—Victoria (French; ♂♀); Mittagong, N. S.W. (Froggatt; ♂♀ in cop.).

3. T. (Phymatothynnus) distinctus Guér.

Lophocheilus distinctus Guér., Mag. de Zool. xii. p.12, P.103, figs.14-15(♂).

I have not seen the type of this insect, and am unable to recognise it from the description, which is very poor. It seems to be near *T. nitidus* Sm., which may possibly have to be sunk as a synonym, but at present I think it best to keep them separate.

Hab.—Australia.

4. T. (Phymatothynnus) nitidus Sm.

Thynnus (*Agriomyia*) *nitidus* Sm., Cat. Hym. B.M. vii. p.30, n.77, 1859(♂).

♂. Clypeus short and broad, not much produced, rather narrowly truncate anteriorly, finely punctured, opaque, the apical margin shining, a longitudinal carina reaching from the base to very near the apex. Head and thorax finely punctured with thin grey pubescence, fulvous on the front of the head; head a little broader than the pronotum. Anterior margin of the pronotum elevated, with a deep groove behind it. Median segment rounded, rather short, very finely and closely punctured. Abdomen very flat, narrow at the base, gradually widened to the fourth and fifth segments, which are the broadest; shallowly punctured and shining, a faint depressed transverse line near the base of segments 2-4. Hypopygium very small, rounded and unarmed.

Hab.—Adelaide, S.A.; Perth, W.A.

♀. Unknown.

The antennæ are as long as the thorax and median segment combined, and of almost equal thickness throughout. The interantennal prominence is bilobed.

Subgenus Psammothynnus Ashm.

Psammothynnus Ashm., Canad. Ent. xxxv. 1903.

♂. Joints of the antennæ strongly arcuate beneath, shorter and stouter than in *Phymatothynnus*, the palpi stout, the three apical joints of the maxillary palpi not slender or elongate. Abdomen flattened, the segments not constricted; hypopygium short and not prominent, strongly emarginate, with an appendage of long, stiff hairs on each side. Second recurrent nervure received by the third cubital cell near the base.

♀. Thorax strongly rugose; second abdominal segment with very few transverse carinæ; pygidium simple, not contracted or truncate.

Type *Thynnus* (*Agriomyia*) *depressus* Westw.

5. T. (PSAMMOTHYNNUS) DEPRESSUS Westw.

Thynnus (*Agriomyia*) *depressus* Westw., Arc. Ent. ii. 2, p.107, P.74, figs.5-6, 1844(♂♀).

Zeleboria depressa Sauss., Reise d. Nov. ii. 1, Hym. p.131, 1867.

Psammothynnus depressus Ashm., Canad. Ent. xxxv. 1903(♂♀).

?*Thynnus trisulcatus* Sm., Cat. Hym. B.M. vii. p.45, n.129, 1859(♀).

Hab.—S.W. Australia.

I think I am correct in sinking the name *trisulcatus*, but have not had any opportunity of comparing a series of specimens. There is no carina on the pronotum of the female of this species as in *T. fulvopilosus*.

6. T. (PSAMMOTHYNNUS) FULVOPILOSUS Sm.

Thynnus fulvopilosus Sm., Descr. n.sp. Hym. p.160, 1879(♂♀).

Rhagigaster rugosus Sm., Descr. n.sp. Hym. p.176, 1879(♀; nec ♂).

♂. This is very near *T. depressus* Westw. The pronotum is covered with long fulvous hairs, but I can see no other appreciable difference.

♀. Head subquadrate, broader than long, slightly convex, finely reticulate with sparse and large punctures. Thorax and median segment coarsely punctured; the pronotum rectangular, broader than long, narrower than the head, the anterior margin straight and very slightly produced at the angles, a short, delicate longitudinal carina on the middle of the segment. Median segment nearly as long as the pronotum, obliquely truncate posteriorly. Abdomen opaque, with a few scattered and shallow punctures; basal segment vertically truncate anteriorly, with a deep transverse groove before the apical margin; second segment with three strong transverse carinæ, the apical margin also slightly raised. Pygidium rather narrow, gradually broadened from base to apex, with a median longitudinal carina and the margins a little elevated. Length 6 mm.

Hab.—Adelaide, S.A. (Smith).

The female is very similar to that of *T. depressus*, but differs in the sculpture of the abdomen, especially of the second segment. It will probably prove to be a geographical variety of that species.

Subgenus Zeleboria Sauss.

♂. The males may be distinguished by the three terminal joints of the maxillary palpi being long and slender as in *Tachynomyia*, from which they may easily be distinguished by the form of the head which is not deeply hollowed beneath or bearded on the sides. The first joint of the maxillary palpi is very short; the first joint of the labial palpi is long; and the labrum is small, truncate at the apex, and very sharply narrowed posteriorly. The abdomen is flattened and subpetiolate.

♀. The females show no good distinguishing characters. The fifth ventral segment is punctured, and the pygidium usually not contracted or truncate, but in one species it is elongate and contracted. In the typical group the tarsal ungues are bidentate. The carinæ on the second abdominal segment vary in number, but do not exceed six in any of the species.

Type *Thynnus* (*Agriomyia*) *sexmaculatus* Sm.

Ashmead gives *T. carinatus* Sm., as the type of the genus, but as *T. sexmaculatus* is given first by Saussure, I retain it as the type, and place *T. carinatus* in another subgenus. When the sexes are better known the group may require further division.

7. T. (Zeleboria) sexmaculatus Sm.

Thynnus (*Agriomyia*) *sexmaculatus* Sm., Cat. Hym. B.M. vii. p.32, n.81, 1859(♂).

Zeleboria sexmaculata (Sm.) Sauss., Reise d. Nov. Zool. ii. 1, Hym. p.131, 1867.

♂. Clypeus short, rather broadly truncate at the apex. Pronotum not shortened, the anterior margin only very slightly raised at the sides. Median segment slender. The hypopygium is very similar to that of *T. trivialis*, but rather longer and narrower, and rounded at the apex; the sides are nearly parallel and it is twice as long as broad. I have seen only the type.

♀. Unknown.

In this and in the allied species *T. trivialis* and *T. proximus* the second cubital cell is much shorter than the third; and the three

terminal joints of the maxillary palpi are elongate, but not as much so as in the genus *Tachynomyia*.

Hab.—Sydney (Smith).

8. T. (Zeleboria) proximus, n.sp.

♂. Clypeus a little advanced, rather broadly truncate at the apex, finely punctured; head shallowly punctured on the occiput, finely punctured-rugulose on the front, thinly clothed with fulvous pubescence. Thorax finely and closely punctured; median segment rounded, as broad at the base as long, delicately reticulate. Abdomen subpetiolate, fusiform, shining, the two apical segments punctured. Hypopygium broad at the base, subtriangular, narrowly truncate at the apex, with a strong apical spine. Black; mandibles, anterior margin of clypeus, two minute spots between the antennæ, anterior margin of the prothorax narrowly interrupted in the middle, a minute spot on each side before the tegulæ, a narrow, longitudinal spot on the scutellum, a transverse line on the postscutellum and a spot on each side of the second and third abdominal segments yellow; femora, tibiæ, tarsi and tegulæ ferruginous. Wings hyaline tinted with yellow, nervures fuscous. Length 11-14 mm.

In another specimen the spots on the third abdominal segment and on the scutellum are absent.

♀. Head strongly narrowed posteriorly, only half as wide on the posterior as on the anterior margin, flat above, flattened and slightly concave on the sides, eyes situated on the sides; the whole head shining, with a few scattered punctures and a short longitudinal sulcus between the antennæ. Thorax and median segment sparsely punctured; pronotum nearly square, with a faint median sulcus from the anterior margin to the centre; median segment broadened from the base, obliquely truncate posteriorly. First abdominal segment truncate anteriorly, apical margin depressed, giving an appearance of a transverse carina before the apex; second segment with six strong transverse carinæ, including the recurved apical margin; the remaining segments smooth on the basal half, shallowly punctured on the

apical half. Pygidium lanceolate, very much contracted, slightly broadened towards the apex by the expansion of the margins of the hypopygium which form marginal carinæ, leaving the epipygium as a central carina. Dark fuscous; head, pronotum and legs dark ferruginous; second abdominal segment and pygidium fusco-ferruginous. Length 7-9 mm.

Hab.—Leura, N. S.W. (Froggatt; ♂♀ in cop.). Types in Coll. Froggatt.

The male is very near *T. sexmaculatus* Sm., but the shape of the hypopygium and of the median segment is different.

9. T. (Zeleboria) trivialis Sm.

Thynnus (*Agriomyia*) *trivialis* Sm., Cat. Hym. B.M. vii. p.38, n.101, 1859(♂♀).

Aelurus fulvifrons Sm., Cat. Hym. B.M. vii. p.56, n.12, 1859(♂♀).

Thynnus impatiens Sm., Descr. n.sp. Hym. p.168, n.29, 1879(♂).

The male differs from that of *T. proximus* in having the pronotum shorter, with the anterior margin strongly raised; hypopygium narrower at the base, sides almost parallel, truncate at the apex, with a short apical spine. The posterior margin of the pronotum is yellow and there is a yellow spot on each side of the second, third, and fourth abdominal segments.

♀. Head much broader than long, narrowed posteriorly and strongly rounded at the angles, shining and sparsely punctured. Thorax and abdomen finely rugose; pronotum as long as broad, anterior angles prominent and subtuberculate; first abdominal segment rather broadly depressed on the apical margin, carina before the depression straight and transverse; second segment with five transverse carinæ; pygidium rather small, not contracted, rounded at the apex, with an obscure longitudinal carina; fifth ventral segment punctured. Fuscous; head, second abdominal segment and pygidium fusco-ferruginous; mandibles, antennæ, legs and apical margin of the abdominal segments rufo-testaceous. Length 6 mm.

Hab—Lower Plenty (Bakewell); Victoria (French); Champion Bay, W.A. (Smith).

The types of *T. trivialis* and *T. fulvifrons* were in Bakewell's Collection and appear to be lost.

10. T. (Zeleboria) nitidulus, n.sp.

♂. Clypeus short and narrowly truncate at the apex; antennæ as long as the head and thorax; head narrowed behind eyes. Head and thorax closely and finely punctured; anterior margin of pronotum slightly raised at the sides; median segments slender, finely transversely rugulose. Abdomen subpetiolate, elongate fusiform, smooth and shining, with a few very minute punctures; first segment with a deep sulcus from the base to the middle. Hypopygium small, the sides parallel, truncate at the apex, with a short spine. Black; with sparse grey pubescence on the head and thorax; mandibles except at the apex, a narrow, interrupted line on anterior margin of pronotum and a transverse line on postscutellum yellow; legs except the coxæ and trochanters ferruginous. Wings hyaline, slightly iridescent, nervures black. Length 11-14 mm.

♀. Head broader anteriorly than long, very strongly rounded at the posterior angles, shining and very sparsely punctured, with a deep median sulcus between the antennæ. Thorax and median segment finely punctured; pronotum narrower than head, nearly square, with a median sulcus from the anterior margin not reaching beyond the middle. Abdomen finely punctured-rugulose; first segment depressed at the apex, leaving a straight carina before the depression, the extreme apical margin slightly raised; second segment with five strongly raised transverse carinæ, including the raised apical margin. Pygidium small, not constricted, epipygium with a faint longitudinal carina. Fifth ventral segment punctured. Black; head, legs and pygidium ferruginous; thorax and median segment fusco-ferruginous. Length 9 mm.

Hab.—Melbourne (French).

The labrum of the male is small, truncate anteriorly and fringed with long hairs. The first joint of the maxillary palpi is about half as long as the second, the three apical joints are

slender, the fourth being much the longest. The first joint of the labial palpi is nearly as long as the three apical joints combined. The claspers are slender at the apex.

11. T. (Zeleboria) cryptoides Sm.

Thynnus (*Agriomyia*) *cryptoides* Sm., Cat. Hym. B.M. vii. p.33, n.84, 1859(♂).

♂. Clypeus rather short, narrowly truncate at the apex; the interantennal prominence bilobed. Head and thorax finely and closely punctured; median segment slender, very finely transversely striated and shining. Abdomen subpetiolate, elongate fusiform, shining, with a few small scattered punctures. Hypopygium subtruncate at the apex, slightly produced at the apical angles with a central spine.

♀. Head a little broader than long, slightly rounded at the posterior angles, moderately convex, shining, very finely and sparsely punctured. Thorax and median segment rather closely punctured, pronotum rectangular, much broader than long, with a longitudinal sulcus from the anterior margin reaching beyond the middle; median segment obliquely truncate posteriorly. Abdomen vertically truncate at the base, closely and shallowly punctured; first segment with the apical margin slightly raised and a transverse carina before it; second segment with four transverse carinæ including the raised apical margin. Pygidium simple, with a low, longitudinal carina. Entirely light castaneous-brown. Length 6 mm.

Hab.—River Plenty (Smith); Melbourne (Bakewell; ♂♀ in cop.); Gosford, N. S.W. (Froggatt; ♂♀ in cop.).

Type of ♀ in Oxford University Museum.

12. T. (Zeleboria) ada, n.sp.

♂. Slender; clypeus rather short, broadly truncate anteriorly, finely and closely punctured, pubescent. Head finely and closely punctured, with a faint median impressed line from between the antennæ halfway to the anterior ocellus. Pronotum depressed, the anterior margin raised; shining, with fine and very shallow

punctures. Mesonotum and scutellum closely punctured, the scutellum rather broadly subtruncate at the apex. Median segment slender, much longer than broad, shining, very shallowly punctured, with a short, median, impressed longitudinal line from the base. Abdomen subpetiolate, slender, flattened above and beneath, broadest at the third and fourth segments, shining, sparsely and very shallowly punctured, the two apical segments more strongly punctured, with thin, long, cinereous pubescence on the sides. Hypopygium small, prominent, rounded at the apex, without a spine. Black; anterior margin of the clypeus, a small spot at the base of each antenna, anterior margin of the pronotum, narrowly interrupted in the middle, a short line on each side of the posterior margin before the tegulæ, a small spot on the mesopleuræ, a spot on the scutellum and a transverse line on the postscutellum, yellow. Legs dark fusco-ferruginous. Wings hyaline, faintly tinted with yellow, nervures black. Length 10-12 mm.

Hab.—Roebourne, N. W. Australia (C. French).

The anterior margin of the labrum is nearly straight, ciliate; the labrum is strongly narrowed posteriorly. The three apical joints of the maxillary palpi are very long. The second cubital cell is much shorter than the third.

13. T. (Zeleboria) agnatus, n.sp.

♂. Clypeus depressed at the base, a little convex in the centre, rather narrow and slightly emarginate at the apex, with very fine, thin pubescence. Antennæ not longer than the thorax and median segment combined. Head finely punctured, a little narrowed posteriorly, interantennal carinæ oblique and divided by a sulcus. Pronotum very delicately punctured, the anterior margin slightly raised; mesonotum and scutellum rather more strongly punctured. Median segment as long as the mesonotum and scutellum combined, very minutely punctured, with short grey pubescence. Abdomen subpetiolate, fusiform, very finely and shallowly punctured; beneath more strongly punctured and clothed with long cinereous pubescence; first ventral segment

with a carina at the base and an oblique triangular truncation at the apex. First dorsal segment with a longitudinal sulcus not reaching the apex; second and third segments with a slightly depressed transverse line near the base. Hypopygium broad at the base, with a spine on each side, thence rather narrowly produced, slightly emarginate at the apex on each side of the apical spine. Black; mandibles except at the apex, clypeus, interior margin of the eyes, a small spot at the base of each antenna, anterior margin of the pronotum and posterior margin of the sides, tegulæ, a small spot on the mesonotum, a large one on the mesopleuræ, a small spot on the centre of the scutellum and one at each of the anterior angles, a very small spot on each side of the median segment near the apex and coxæ beneath yellow; legs ferruginous, stained with fuscous on the tibiæ and tarsi; abdominal segments 1-4 with a broad creamy-white transverse band on each side near the apical margin. Wings long, hyaline, a fuscous band occupying the whole of the radial and third cubital and part of the second cubital and second discoidal cells; nervures fuscous. The three apical joints of the maxillary palpi are slender and elongate, and there is a tuft of very long hairs on the labium.

Hab.—Kuranda, near Cairns, Q. (Turner).

14. T. (Zeleboria) politus, n.sp.

♂. Head and thorax punctured-rugose, with thin cinereous pubescence, clypeus slightly advanced, finely and closely punctured, truncate anteriorly; head rather small, a straight transverse carina between the antennæ. Antennæ longer than the head and thorax combined. Scutellum sparsely punctured, narrowly truncate at the apex. Median segment rather long and slender, delicately reticulate. Abdomen slender, subpetiolate, flattened beneath, shining; segments 2-5 with a slight, impressed, transverse line near the base, first segment with a short longitudinal sulca from the base, epipygium pointed, hypopygium narrowly rounded at the apex, with a short apical spine not pro-

jecting much beyond the epipygium. Black; a spot on each side of the vertex, tegulæ, femora, tibiæ and tarsi ferruginous; an interrupted line on the anterior margin of the pronotum and a spot on the postscutellum whitish-yellow. Wings hyaline, nervures fuscous, stigma ferruginous. Length 10 mm.

♀. Head suborbicular, slightly convex above, shining; pronotum broader than long, with a median sulcus reaching from the anterior nearly to the posterior margin, anterior angles produced into blunt spines; sparsely punctured. Median segment very short, obliquely truncate posteriorly, finely punctured. Abdomen shining, very sparsely punctured; first segment depressed on the apical margin, leaving a transverse carina just before the apex; second segment with three prominent transverse carinæ and the apical margin slightly recurved, forming a fourth less prominent carina; third segment with an impressed transverse line near the base; pygidium oblique, rather narrow, the sides nearly parallel, narrowly rounded at the apex. Tarsal ungues simple. Fuscous; head and second abdominal segment ferruginous; legs fusco-ferruginous. Length 6 mm.

Hab.—Cowra, N. S.W. (Froggatt). Types in Coll. Froggatt.

15. T. (Zeleboria) calcaratus Sm.

Thynnus (*Agriomyia*) *calcaratus* Sm., Cat. Hym. B.M. vii. p.40, n.105, 1859(♂).

I have not seen this species. It is evidently closely allied to *T. femoratus* as described above, but is much smaller, and has the median segment smooth at the base and the abdomen entirely black. These differences, together with a slight difference in the position of the tubercle on the posterior femora, are, I think, sufficient to justify separation.

Hab.—Lower Plenty (Bakewell).

16. T. (Zeleboria) femoratus, n.sp.

♂. Clypeus advanced, rather narrowly truncate anteriorly, convex, finely and closely punctured; head concave beneath, finely and very closely punctured; with cinereous pubescence,

long on the sides. Thorax very closely punctured; median segment long, finely punctured. Abdomen elongate, flattened beneath, sparsely punctured, shining; a short median sulcus from the base of the first segment and a slightly depressed transverse line near the base of segments 2-5, the two apical segments with long thin pubescence and more strongly punctured. Hypopygium subtriangular, with a small apical spine, not projecting very far beyond the epipygium. Claspers very long and slender. Posterior femora armed with a large acute tubercle near the base beneath. Opaque black; mandibles, anterior margin of the clypeus, a narrowly interrupted line on the anterior margin of pronotum and a small spot on postscutellum pale yellow; a spot on each side on the occiput, tibiæ, tarsi and femora, second, third and fourth abdominal segments dark ferruginous; base of the femora black, fourth abdominal segment more or less stained with black. Wings hyaline, faintly iridescent, nervures black. Length 12 mm.

♀. Head suborbicular, slightly convex, smooth and shining. Pronotum longer than broad, the sides parallel, shining, sparsely punctured, with a sulcus from the anterior margin to the centre. Median segment broadened from the base, short, obliquely truncate posteriorly, and punctured. Abdomen sparsely punctured, first segment with the apical margin depressed, leaving a transverse carina before the apex. Second segment with two strongly raised transverse carinæ, the apical margin recurved forming a third, less prominent, carina. Pygidium oblique, the sides parallel, not very narrow, rounded at the apex. Fuscous, the head bright ferruginous; pro- and mesothorax, pygidium and legs fusco ferruginous; second abdominal segment bright testaceous, carinæ fusco-ferruginous; the segments beneath at the sides pale testaceous. Length 6 mm.

Hab.— Bombala, N. S.W. (Froggatt). Types in Coll. Froggatt.

The male is very near *T. calcaratus* Sm., but that insect is black except the yellow mandibles and margin of the clypeus and the ferruginous tibiæ and tarsi. The tubercle on the posterior femora is in the middle in *T. calcaratus*, not near the base as in the

present species. The type of *T. calcaratus* appears to be lost, probably owing to Smith's extremely careless habits as to marking type-specimens.

17. T. (Zeleboria) volatilis Sm.

Thynnus (*Agriomyia*) *volatilis* Sm., Cat. Hym. B.M. vii. p.33, n.85, 1859(♂).

♂. Clypeus narrowly produced and truncate anteriorly. Head and thorax finely rugose; pronotum shining and finely rugulose; scutellum with an obscure carina from base to apex. Median segment slender, delicately transversely rugulose, almost smooth at the base. Abdomen subpetiolate, elongate-fusiform, shining and sparsely punctured. Hypopygium triangular, narrowly truncate at the apex, with a small apical spine. Head and pronotum with long, thin, fulvous pubescence, longest on the sides of the head.

Hab.—Australia (Smith); Adelaide(?).

Nearest to *T. cryptoides* Sm., but differs much in sculpture and in the shape of the hypopygium.

18. T. (Zeleboria) leucostictus, n.sp.

♂. Clypeus narrowly advanced in the middle and truncate at the apex, closely and finely punctured, extreme apex smooth and shining, with a delicate carina from base to centre. Antennæ shorter than head and thorax combined. Head finely rugose, interantennal carina not developed. Thorax finely punctured, scutellum subtriangular, truncate at the apex. Median segment very closely and minutely punctured; with grey pubescence, thickest on the sides. Abdomen slender, elongate-fusiform, shining and almost smooth. Hypopygium small and narrow, subtriangular at the apex. Black; a spot on each side of the vertex, tegulæ and legs except coxæ and trochanters ferruginous; a spot on each side of second, third and fourth abdominal segments creamy-white. Wings hyaline, nervures fuscous. Length 10 mm.

Hab.—Yass, N. S.W. (Froggatt). Type in Coll. Froggatt.

The antennæ are shorter and stouter than in other species of the group.

19. T. (Zeleboria ?) longicornis, n.sp.

♂. Clypeus narrowly subtruncate at the apex, densely covered with silver pubescence. Head very finely and closely punctured, broadly emarginate posteriorly, interantennal prominence deeply emarginate at apex; antennæ long and slender, as long as the abdomen. Thorax finely and closely punctured; anterior margin of pronotum strongly raised; scutellum with a depressed transverse row of large punctures at base, narrowly rounded at apex. Median segment long and rather slender, finely punctured at base, delicately transversely rugulose at apex, with an obscure sulca from the base to the middle. Abdomen subpetiolate, elongate, flattened, smooth and shining; the two apical segments coarsely punctured. Hypopygium rounded, with a slightly recurved apical spine. Entirely black. Wings hyaline, faintly tinged with fuscous, nervures fuscous. Length 18 mm. Exp. al. 28 mm.

Hab.—N.W. Australia (French).

This species approaches *Tachynomyia*, but I think it is most naturally placed here.

Subgenus Glaphyrothynnus, n.subgen.

Zeleboria Sauss., Reise d. Nov. Zool. ii. 1, Hym. p.131, 1867 (partim); Ashm., Canad. Ent. xxxv. 1903.

♂. Labrum strongly rounded anteriorly, broadly truncate posteriorly and connected with the basal portion by a narrow petiole. Maxillæ very broad at the base; maxillary palpi rather short and very slender, first joint as long as or longer than the others; labial palpi slender, second joint almost as long as first. Abdomen flattened, the segments not constricted; hypopygium usually without an apical spine, blunt or emarginate. The second recurrent nervure is received by the third cubital cell at some distance from the base.

♀. Tarsal ungues simple; fifth ventral segment punctured; second abdominal segment usually with three transverse carinæ;

pygidium variable, broad and vertically truncate or contracted and recurved at apex.

Type *Thynnus xanthorrhoei* Sm.

20. T. (Glaphyrothynnus) xanthorrhoei Sm.

Thynnus xanthorrhoei Sm., Cat. Hym. B.M. vii. p.28, n.70, 1859(♂).

Thynnus planifrons Sm , *l.c.* p.46, n.134, 1859(♀).

?*Thynnus plebejus* Sauss., Reise d. Nov. Zool. ii. 1, Hym. p.123, n.11, 1867(♀).

Zeleboria xanthorrhoei Sauss., Stett. Ent. Zeit. xxx. p.60, n.10, 1869(♂♀).

♂. Hypopygium deeply and broadly emarginate at the apex.

♀. Pygidium rather broad, vertically truncate posteriorly and longitudinally rugose-striate.

Hab.—Sydney.

21. T. (Glaphyrothynnus) contiguus, n.sp.

♂. Clypeus large, convex, very broadly truncate at apex, with a short carina at base; interantennal prominence very widely V-shaped. Head and thorax finely and closely punctured, scutellum subtriangular, rather narrowly truncate at apex. Median segment rounded, very finely and closely punctured. Abdomen elongate, subpetiolate, flattened, shining, shallowly and closely punctured; first segment with a deep sulcus from base not reaching apex; segments 2-4 slightly depressed at base; segments 1-4 depressed narrowly on apical margin, with a raised mark emarginate posteriorly before apex. Epipygium broadly truncate at apex; hypopygium small, rounded at apex, without a spine. Black; mandibles, clypeus except a median line on basal half, margins of eyes as high as base of antennæ, a line on each side of vertex, margins of pronotum, narrowly interrupted on anterior margin, tegulæ, a large curved mark on mesopleuræ beneath anterior wings, a spot above base of intermediate coxæ, a small spot on scutellum, postscutellum, a large spot on each side of median segment at apex and a small spot on each side of abdominal segments 2-5 yellow. Legs, except coxæ and trochanters,

and a minute spot at summit of the eyes ferruginous. Wings hyaline, nervures fuscous. Length 14 mm.

Hab.—Shoalhaven, N. S.W. Type in Coll. Froggatt.

Nearest to *T. xanthorrhoei* Sm., but is slenderer and the divisions between the abdominal segments are more strongly marked.

22. T. (Glaphyrothynnus) marginalis Westw.

Thynnus (*Agriomyia*) *marginalis* Westw., Arc. Ent. ii. 2, p.120, P.76, fig.3, 1844(♂).

♂. Clypeus broad and large, convex, with a median longitudinal carina, emarginate at apex. Head rugose. Abdomen rather narrow at base, gradually widened to fourth and fifth segments which are the broadest.

Allied to *T. trifidus* Westw.

♀. Head nearly twice as broad as long, slightly narrowed and rounded posteriorly, shining, finely and shallowly punctured. Thorax shining, finely punctured; pronotum much broader than long; mesonotum very small; median segment short, obliquely truncate posteriorly, sparsely and very finely punctured. Abdomen much broader than thorax, smooth and shining; apical margin of first segment recurved, with a broad depressed area before it; second segment with three transverse carinæ, including the recurved apical margin; third and fourth segments with a raised, curved, punctured mark on each side close to apical margin; pygidium elongate-ovate, the margins elevated at base. Black; antennæ, mandibles and legs dull rufo-testaceous; sides and apical margin of abdominal segments testaceous. Length 9 mm.

Hab.—Albany, W.A. (Brewer); Perth, W.A. (Walker).

Types (♂♀) in Oxford University Museum.

23. T. (Glaphyrothynnus) trifidus Westw.

Thynnus (*Agriomyia*) *trifidus* Westw., Arc. Ent. ii. 2, p.119, P.77, fig.4, 1844(♂).

Zeleboria imitatrix Sauss., Reise d. Nov. ii. 1, Hym. p.132, n.3, 1867(♂).

Thynnus imitator Schulz, Spolia Hymenopterologica, p.161, 1906(♂).

I have not seen the type of Saussure's species, but I think his name applies to this form. The maxillary palpi of *T. trifidus*, however, do not seem to differ from those of *T. carinatus*, but I have not been able to dissect the mouth of either species.

Hab.—Albany, W.A. (Westwood).

24. T. (Glaphyrothynnus) carinatus Sm.

Thynnus carinatus Sm., Cat. Hym. B.M. vii. p. 29, n. 73, 1859(♂).

Zeleboria carinata Sauss., Reise d. Nov. ii. 1, Hym. p. 131, n. 1, 1867(♂♀).

Zeleboria fusiformis Sauss., *l.c.* p. 132, n. 2, 1867(♂).

Saussure's descriptions of the sexes of this variable species are sufficient. It is very nearly allied to *T. trifidus* Westw.

Hab.—Stradbroke Isl. (Boreham); Liverpool, N.S.W. (Froggatt; ♂♀ in cop.); Adelaide, S.A. (British Museum, from F. Waterhouse).

25. T. (Glaphyrothynnus) flavescens Sm.

Thynnus (*Agriomyia*) *flavescens* Sm., Cat. Hym. B.M. vii. p. 68, 1859(♂♀).

♂. Clypeus strongly convex, broadly truncate at apex, sparsely punctured, with a carina from base to apex. Head closely punctured; interantennal carina narrowly V-shaped, produced at apex into a minute tubercle at base of clypeus. Thorax shining and rather sparsely punctured; scutellum large and broadly rounded at apex. Median segment finely and closely punctured. Abdomen elongate, flattened above and beneath, very minutely punctured, apical margins of the segments very narrowly depressed. Hypopygium short, unarmed.

♀. Head much broader than long, rounded posteriorly, smooth and shining. Thorax sparsely punctured; pronotum much broader than long, subconcave above, slightly narrowed posteriorly, the anterior margin straight with a slight elevation in the middle. Median segment closely and finely punctured, short and obliquely truncate posteriorly. Abdomen smooth, with a few scattered punctures; apical margin of first segment not

elevated; second segment with three transverse carinæ, including the raised apical margin; third and fourth segments with a raised curved mark on each side. Pygidium very narrow, the sides parallel, a few delicate longitudinal striæ near base, apex slightly recurved.

Hab.—Adelaide, S.A. (Smith).

Very near *T. trifidus* Westw., and *T. carinatus* Sm.

26. T. (GLAPHYROTHYNNUS) SITIENS, n.sp.

♂. Clypeus strongly convex, rather broadly truncate at apex, sparsely punctured, with a delicate carina from base reaching beyond centre. Head rugose, interantennal carina very broadly V-shaped. Thorax sparsely and rather finely punctured, shining; median segment very minutely punctured. Abdomen elongate, slender, shining and very finely punctured; first segment with a very short sulcus at the base; second segment depressed at base; hypopygium narrow, unarmed at apex, with a short, slender spine on each side near base. Black; mandibles, apex and sides of clypeus, margins of eyes as high as base of antennæ, interantennal carina, margins of pronotum narrowly interrupted on anterior margin, tegulæ, a curved mark on the mesopleuræ beneath the anterior wings and a spot above intermediate coxæ, a spot on mesonotum, a spot on centre of scutellum, postscutellum, a narrow curved mark close to apical margin on each side of second and third abdominal segments, a spot on each side of fourth and fifth segments and a line on anterior coxæ and femora beneath yellow; tibiæ and tarsi and a small spot on each side of vertex ferruginous. Wings hyaline, nervures black. Length 9 mm.

Hab.—Western Australia (Du Boulay). Type in Brit. Mus.

27. T. (GLAPHYROTHYNNUS?) SEDULUS Sm.

Thynnus (*Agriomyia*) *sedulus* Sm., Cat. Hym. B.M. vii. p.35, n.90, 1859(♂).

♂. Clypeus large, broadly produced and truncate at apex, very strongly convex at base, deeply punctured, with a short carina

at base. Head punctured on vertex, rugose on front, interantennal carina short and broadly V-shaped. Thorax and median segment closely punctured, scutellum rather narrowly truncate at apex; median segment depressed and shining at apex. Abdomen subpetiolate, fusiform, shining and sparsely punctured; second segment depressed at base; segments 2-5 with a slightly raised, curved mark before the depressed apical margin; sides of the segments with long scattered hairs. Hypopygium very short, subtruncate at apex, with a tuft of long curved hairs on each side.

Hab.—Swan River, W.A. (Smith).

I have seen only the type.

Subgenus Aeolothynnus Ashm.

Aeolothynnus Ashm., Canad. Ent. xxxv. 1903.

♂. Second recurrent nervure received by the third cubital cell very near base; labrum usually short and truncate anteriorly, in a few species long and slightly emarginate at apex; palpi usually rather stout, first joint of the maxillary palpi short, maxillæ more or less bearded on outer margin. Hypopygium very variable, never with more than three spines. Antennæ of even thickness throughout, usually short.

♀. Tarsal ungues simple (except in *Aeol. sannæ*). Second abdominal segment never with more than five transverse carinæ; fifth ventral segment punctured; pygidium contracted, usually with parallel sides.

Type, *Thynnus* (*Agriomyia*) *cerceroides* Sm.

Ashmead gives *Aeol. multiguttatus* Ashm., as the type of his genus, but, as he has not given any description of that species, his name cannot stand. I have therefore selected a species which answers to the generic characters given by him as the type.

28. T. (Aeolothynnus) westwoodi Guér.

Agriomyia westwoodi Guér., Mag. de Zool. xii. p.4, 1842(♂).
Thynnus intricatus Sm., Cat. Hym. B.M. vii. p.30, n.75, 1859(♂).
Thynnus longiceps Sm., Cat. Hym. B.M. vii. p.46, n.132, 1859(♀).
Thynnus nanus Sm., Descr. n.sp. Hym. p.171, n.35, 1879(♂).

♂. Clypeus produced in middle and narrowly truncate at apex; head and thorax closely and finely punctured; pronotum narrower than head, with the anterior margin raised; median segment very finely punctured, smooth at the extreme base, a feeble longitudinal sulcus from base not reaching middle. Abdomen elongate-fusiform, shining and shallowly punctured, and flattened; first segment with a strong sulcus from base not reaching apex; second segment depressed at base, segments 2-5 with apical margin narrowly depressed. Hypopygium small, narrowly produced and truncate at apex, with a short apical spine.

♀. Head as broad anteriorly as long, very much narrowed posteriorly, and very slightly convex. Head, thorax and median segment smooth and shining; pronotum with a short and deep sulcus from anterior margin not reaching middle, much narrower than head, quadrate, the posterior angles slightly raised. Mesonotum very small, rounded and raised. Median segment almost pointed at base, broadened and oblique posteriorly. Abdomen shining with a few sparse punctures; first segment with a raised carina, slightly emarginate in middle; second segment with four transverse carinæ, including the raised apical margin; three following segments with a raised curved mark on each side. Epipygium lanceolate, sides of hypopygium curved upwards forming a groove in which the epipygium rests.

Colour as in Smith's description of *T. longiceps*. Length 5 mm.

Hab.—Tasmania (Lea); Victoria (French); Mittagong, N.S.W. (Froggatt; ♂♀ in cop.).

29. T. (Aeolothynnus) pulchellus Klug.

Thynnus pulchellus Klug, Physik. Abh. Akad. Wiss. Berlin, p.20, n.13, 1840 [1842] (♂).

Thynnus multipictus Sm., Descr. n.sp. Hym. p.160, n.7, 1879 (♂).

♂. Abdomen slender, flattened beneath, the segments not constricted. Hypopygium small, narrow at base, slightly widened to apex where it is truncate with a short apical spine. Colour very variable.

♀. Head subglobose, nearly as long as broad, strongly rounded posteriorly, depressed at base of mandibles, smooth and shining. Thorax and abdomen smooth; pronotum narrower than head, much broader than long, with a depression on middle of anterior margin; median segment very short, obliquely truncate posteriorly. First abdominal segment with the apical margin depressed, and a raised curved mark emarginate in middle just before it; second segment with four transverse carinæ, including the raised apical margin. A raised curved mark, sparsely punctured on each side of third and fourth segments. Pygidium lanceolate, the sides parallel, with a tuft of fulvous hairs on each side before apex. Head and thorax fusco-ferruginous; legs testaceous-brown; abdomen castaneous. Length 4-5 mm.

Hab.—Melbourne to Sydney (♂♀ in cop.).

30. T. (Aeolothynnus) pulcherrimus, n.sp.

♂. Clypeus short, narrowly truncate at apex. Head finely and closely punctured, interantennal prominence not very strongly developed, transverse at apex and divided by a longitudinal sulcus, which extends on the front towards anterior ocellus. Thorax shining, more finely punctured than head; median segment almost smooth, obscurely transversely striated. Abdomen elongate, almost smooth; first segment narrow at base, shorter than in *T. pulchellus*, with a very deep median sulcus from base almost reaching apex; second segment depressed at base. Hypopygium narrow, with almost parallel sides, the apical spine short. Black; mandibles, clypeus, two large spots between antennæ, margins of eyes narrowly interrupted at summit, margins of pronotum, a large quadrate spot on mesonotum, a large spot on scutellum, a transverse line on postscutellum, a large mark almost interrupted in middle on mesopleuræ beneath anterior wings, another beneath and behind posterior wings, a spot on each side at apex of median segment, and a mark on each side at apex of each abdominal segment except the seventh, produced transversely and lunulate on segments 3-6, yellow; a spot on each side of vertex, second and third abdominal segments and

legs ferruginous. Wings hyaline, nervures testaceous-brown. Length 9 mm.

♀. Head smooth and shining, much broader anteriorly than long, strongly narrowed posteriorly and slightly convex. Pronotum almost square, with a fine median sulcus from anterior margin to centre. Mesonotum longer than broad, median segment obliquely truncate posteriorly. Abdomen almost smooth, much broader than thorax; first segment narrowly depressed on apical margin; second segment with four transverse carinæ including the raised apical margin. Pygidium narrow, elongate, slightly widened in middle. Head and thorax ferruginous-brown, the median segment black, abdomen and legs testaceous, coxæ, trochanters, and femora fuscous. Length 6 mm.

Hab.—Wattle Flat, N.S.W. (Froggatt; ♂♀ in cop.).

Types in Coll. Froggatt.

The male is very near *T. pulchellus* Klug, almost the only points of difference being the presence of a frontal sulcus and the shape of the basal abdominal segment. The female is quite different, and the correctness of the pairing may be relied upon.

31. T. (Aeolothynnus) quadricarinatus Sauss.

Thynnus quadricarinatus Sauss., Reise d. Nov. Zool. ii. 1, Hym. p.124, n.13, 1867(♀).

I am unable to identify this species, but it seems from the description to be allied to the pulchellus-group.

Hab.—Sydney (Saussure).

32. T. (Aoelothynnus) minutus Sm.

Thynnus (*Agriomyia*) *minutus* Sm., Cat. Hym. B.M. vii. p.35, n.92, 1859(♂).

♂. Clypeus produced and very narrowly truncate at apex; interantennal prominence long, bilobed, the lobes separated by a narrow sulcus. Head and thorax finely and closely punctured; median segment shining, very delicately transversely striated, smooth at base. Abdomen slender, shallowly punctured; first segment with a sulcus from base not reaching apex; second segment

depressed at base; segments 2-5 with a rather strongly raised curved mark on each side before the depressed apical margin. Hypopygium narrow, truncate at apex, with a small spine, the sides nearly parallel.

Hab.—N.W. Coast of Australia (B.M.).

33. T. (Aeolothynnus) tenuis, n.sp.

♂. Clypeus narrowly produced and truncate at apex. Head very finely rugose, opaque; interantennal prominence small, emarginate at apex. Thorax finely punctured, median segment very delicately punctured. Abdomen elongate, shining, first segment with a deep sulcus from base not reaching apex; segments 1-5 with a raised curved mark on each side before the narrowly depressed apical margin. Hypopygium short, with a fairly strong apical spine, angles at base of spine slightly produced. Black; mandibles and a line on postscutellum whitish; margins of pronotum obscure testaceous; second and third abdominal segments ferruginous; femora fusco-ferruginous; tibiæ and tarsi testaceous. Wings hyaline, iridescent, nervures fusco-ferruginous. Length 6 mm.

Hab.—Mackay, Q. (Turner).

Nearest to *T. minutus* Sm.

34. T. (Aeolothynnus) pygmaeus, n.sp.

♂. Clypeus subtriangular, rather short and very narrowly truncate at apex, with a carina from base not reaching apex. Head closely and rather strongly punctured, the interantennal carina V-shaped. Thorax and median segment shining and more finely punctured; pronotum short; scutellum large and broad. Abdomen subpetiolate, very flat, shining and very delicately punctured. Hypopygium small, without an apical spine. Antennæ very short. Black; mandibles, clypeus except at base, margins of eyes narrowly interrupted at summit and on outer margin, interantennal carina, margins of pronotum, tegulæ, a large curved mark on mesopleuræ beneath anterior wings and a spot above base of intermediate coxæ, a spot on scutellum, post-

scutellum, a large irregular spot on each side of median segment near apex, and a narrow curved mark, broadest on the sides, on each side of abdominal segments 2-5 close to apical margin yellow. Tarsi, tibiæ and apex of femora pale ferruginous. Wings hyaline, iridescent, nervures pale ferruginous. Length 5 mm.

Hab.—Victoria (French).

35. T. (Aeolothynnus) rubromaculatus, n.sp.

♂. Clypeus narrowly produced and truncate at apex, with a delicate carina from near base almost reaching apex. Head and thorax punctured; interantennal carina very broadly V-shaped; scutellum large. Median segment very closely and finely punctured. Abdomen subpetiolate, flat, minutely punctured. Hypopygium small and narrow, without an apical spine. Black; mandibles, sides of the clypeus, interantennal carina, margins of eyes narrowly interrupted at summit, margins of pronotum, tegulæ, two large spots on mesopleuræ, a quadrate spot on mesonotum, scutellum except at base, postscutellum, a longitudinal mark on apical portion of median segment and a round spot on each side of it, and a narrow curved band, broadest on sides, close to apical margin of abdominal segments 2-5 yellow. Apex of first abdominal segment and the whole of second and third segments and legs light ferruginous. Wings hyaline, iridescent, nervures fuscous, stigma testaceous. Length 6-7 mm.

Hab.—Victoria (French); Wattle Flat, N.S.W. (Froggatt).

The scutellum is rather narrower at the apex than in *T. pygmæus*, to which it is nearly allied.

36. T. (Aeolothynnus) innocuus, n.sp.

♂. Clypeus short and not much produced, broadly truncate at apex, with a delicate carina from base not quite reaching apex. Head finely rugose, interantennal carina not developed. Thorax finely and closely punctured; anterior margin of pronotum broadly and slightly emarginate; scutellum rather long, truncate

at apex, with an obscure median carina. Median segment very delicately transversely striated. Abdomen short, subpetiolate, shining and shallowly punctured. Hypopygium narrow, truncate at apex and unarmed. Black; mandibles at base and post-scutellum pale yellow; margins of pronotum obscurely testaceous; mandibles at apex, anterior margin and a small spot on centre of clypeus, a spot on each side of vertex, abdomen except the two apical dorsal segments, and legs except coxæ and trochanters ferruginous. Wings hyaline, iridescent, nervures fusco-ferruginous. Length 7 mm.

Hab.—Perth, W.A. Type in Brit. Mus.

37. T. (Aeolothynnus) generosus, n.sp.

♂. Clypeus short, narrowly truncate at apex and shallowly punctured. Head finely rugose, interantennal prominence represented only by a small tubercle at base of each antenna, a very delicate, longitudinal, shining carina between antennæ reaching half-way to anterior ocellus. Thorax closely and finely punctured; anterior margin of pronotum straight and very slightly raised; scutellum more strongly punctured, with a faint carina from centre to apex, where it is narrowly truncate. Median segment delicately transversely striated, as broad at base as long. Abdomen elongate-fusiform, shining and shallowly punctured, the segments not constricted; first segment with a sulcus from base nearly reaching apex; second segment depressed at base. Hypopygium truncate at apex, with a small spine. Black; anterior margin of clypeus, a spot at base of mandibles, a minute spot at base of antennæ, anterior margin of pronotum narrowly interrupted, base of tegulæ, a spot on each side of first abdominal segment, and a narrow, curved, transverse mark on each side before apical margin of the four following segments creamy-white; a spot on each side of vertex and legs ferruginous. Wings hyaline, nervures black, stigma fusco-ferruginous. Length 9 mm.

♀. Head smooth and shining, rather broader anteriorly than long, narrowed and rounded posteriorly. Thorax and median segment almost smooth, pronotum as broad as long, with a short

and obscure longitudinal sulcus from anterior margin, anterior angles slightly prominent. Mesonotum longer than broad; median segment rather slender, obliquely truncate posteriorly the angles at the base of the truncation rounded. Abdomen shining and sparsely punctured; second segment with four transverse carinæ, including the raised apical margin; first, third, fourth and fifth segments with a raised, strongly rounded mark on each side before apical margin. Fifth ventral segment punctured. Pygidium lanceolate, slightly widened at apex. Entirely lightly ferruginous-brown. Length 6 mm.

Hab.—Adelaide, S.A.

Types in Brit. Mus.

38. T. (Aeolothynnus) penetratus Sm.

Thynnus penetratus Sm., Descr. n.sp. Hym. p.158, n.1,1879(♂).

♂. Clypeus very narrowly truncate at apex, with a delicate carina from base to beyond centre. Head and thorax very finely and closely punctured; scutellum narrowly rounded at apex. Median segment very delicately punctured-rugulose, smooth and shining at base. Abdomen elongate-fusiform, shining and very minutely punctured, flattened. Hypopygium broadly rounded at apex, with a minute spine.

Hab.—Swan River, W.A. (Smith).

Allied to *T. westwoodi* Guér., but the hypopygium is very different, and the scutellum is rounded at the apex, not truncate.

39. T. (Aeolothynnus) beatrix, n.sp.

♂. Clypeus very narrowly truncate at apex, with a delicate carina from base not reaching apex, finely and closely punctured. Head and thorax very closely punctured; interantennal prominence only represented by a short carina above base of each antenna; scutellum rather long, subtriangular, truncate at apex. Median segment rounded, very delicately transversely striated. Abdomen shining and shallowly punctured, fusiform and flattened; second segment depressed at base; epipygium rugose. Hypopygium subtriangular, rounded at apex, with a very short spine.

Black; anterior margin of clypeus, margins of eyes as high as base of antennæ, a spot at base of mandibles, anterior margin of pronotum narrowly interrupted, tegulæ, a small spot on post-scutellum and a narrow curved line on each side of second, third and fourth abdominal segments just before apical margin white, anterior legs fuscous. Wings hyaline, nervures black. Length 10-12 mm.

♀. Head broader anteriorly than long, narrowed and rounded posteriorly, smooth and shining, with a few minute and scattered punctures, a short sulcus between the antennæ; clypeus with a carina from base. Thorax and median segment rather shallowly punctured; pronotum longer than broad; mesonotum small; median segment obliquely truncate posteriorly. Abdomen shining, rather sparsely punctured, first segment with the apical margin slightly raised, broadly depressed before apex, leaving a strong carina curved at the sides before the depression; second segment with four transverse carinæ, including the raised apical margin. Pygidium lanceolate, slightly widened at apex. Fifth ventral segment punctured. Black; head, second abdominal segment, pygidium and legs fusco-ferruginous; the depressed apical portion of the first abdominal segment testaceous. Length 7-10 mm.

Hab.—Woodford, N.S.W. (Waterhouse; ♂♀ in cop.), Leura; Mittagong, N.S.W. (Froggatt; ♂♀ in cop.).

The antennæ of the male are rather longer than in *T. pulchellus*.

40. T. (Aeolothynnus) planiventris, n.sp.

♂. Clypeus narrowly produced and truncate at apex, with a carina from base not quite reaching apex; interantennal carinæ oblique, not meeting at apex. Head and thorax very closely punctured; anterior margin of pronotum straight and slightly raised; median segment delicately rugulose at base, very finely transversely striated at apex. Abdomen subpetiolate, fusiform, flattened above and beneath, almost smooth; first segment with a very short sulcus from base; second segment depressed at base. Hypopygium small, a little broader at apex than at base, sub-

truncate at apex, the angles a little produced, but not forming spines, apical spine blunt. Black; mandibles at base, extreme apex of clypeus and of interantennal carinæ, anterior margin of pronotum narrowly interrupted, a spot on scutellum, post-scutellum and a large spot on each side of abdominal segments 2-6 pale yellow; a spot on each side of vertex, tegulæ, a large spot at base of second abdominal segment and legs, except coxæ and trochanters ferruginous. Wings hyaline, nervures black. Length 8 mm.

Hab.—Western Australia (Du Boulay). Type in Brit. Mus.

41. T. (Aeolothynnus) decoratus Sm.

Thynnus decoratus Sm., Descr. n.sp. Hym. p.159, n.5, 1879(♂).

♂. Clypeus short and broad, with a small tubercle in centre, narrowly truncate at apex. Head and thorax shining, finely and closely punctured; interantennal carina broadly V-shaped, interrupted at apex by a smooth longitudinal line. Anterior margin of pronotum raised and slightly emarginate; scutellum rather long and truncate at apex. Median segment very delicately transversely striated, almost smooth at base. Abdomen flattened, fusiform, very delicately punctured and shining; first segment with a sulcus from base reaching nearly to apex; second segment depressed at base; segments 2-5 depressed on apical margin, with a raised curved mark narrowly emarginate posteriorly before apex. Hypopygium ending in three spines, the central spines strong, those at the apical angles very short.

Hab.—Adelaide, S.A. (Smith).

42. T. (Aeolothynnus) sodalis, n.sp.

♂. Clypeus very narrowly truncate at apex, very finely punctured. Head and thorax shining, rather closely punctured, interantennal prominence bilobed, the lobes long and separated by a narrow frontal sulcus; pronotum short, anterior margin raised, broadly but slightly emarginate; scutellum rather broadly subtruncate at apex. Median segment shining, very delicately transversely striated. Abdomen flattened, fusiform, very

minutely punctured; basal segment short, second segment depressed at base; apical margin of the segments depressed, with a raised curved mark on each side. Hypopygium short and small, truncate at apex, with a short spine. Black; vertex, apex of scutellum, legs except coxæ and trochanters, and abdomen except a spot at base of first segment light ferruginous; clypeus, interantennal prominence, margins of eyes interrupted at summit, margins of pronotum, a spot on mesonotum, tegulæ and a line above them, a large curved mark on mesopleuræ, a spot on scutellum, postscutellum, a large spot on median segment, almost divided in middle, a spot on each side near apex, and a spot at apex of coxæ yellow. Length 6 mm.

Hab.—Adelaide, S.A. (F. Waterhouse). Type in Brit. Mus.

Near *T. decoratus* Sm., but the basal abdominal segment is shorter and without the deep longitudinal sulca. The hypopygium and interantennal prominence also differ.

43. T. (Aeolothynnus) mackayensis, n.sp.

♂. Clypeus moderately advanced and rather narrowly truncate at apex; interantennal prominence bilobed, divided by a short longitudinal sulcus. Head and thorax very closely and finely punctured, scutellum short. Median segment rounded, depressed at apex, very finely punctured, smooth at base. Abdomen subpetiolate, slender, fourth segment the broadest; basal segment shining, long and narrow, gradually widened to apex, with a sulcus from base nearly reaching apex; second segment shining, minutely punctured; the remaining segments subopaque, very finely and closely punctured. Hypopygium not very broad, sides almost parallel, rounded at apex, with a short apical spine. Black; mandibles, clypeus, inner margin of eyes broadly, a small spot at base of each antenna, anterior margin of pronotum narrowly interrupted, a small mark on posterior margin before base of wing, a spot in centre and a smaller one at each of anterior angles of scutellum, postscutellum, a spot on mesopleuræ, apical half of median segment interrupted by a narrow black line, a spot on each side of first and third abdominal segments

near apical angles, and a transverse band on second segment yellow; a spot on each side of vertex ferruginous. Wings hyaline, radial cell subfuscous, nervures fuscous. Length 11 mm.

♀. Head broader anteriorly than long, very strongly narrowed posteriorly, shining, very minutely punctured, a short longitudinal sulcus between antennæ. Pronotum subquadrate, very delicately and closely punctured, a row of large setigerous punctures along anterior margin. Median segment more sparsely punctured, obliquely truncate posteriorly. First abdominal segment with a raised curved mark on each side before the broadly depressed apical margin; second segment with four transverse carinæ, including the raised apical margin; the three following segments sparsely punctured, with the apical margin narrowly depressed. Pygidium deflexed, narrowly ovate, with a tuft of golden hairs on each side springing from beneath epipygium. Black; head ferruginous; legs, second abdominal segment and pygidium fusco-ferruginous. Length 7 mm.

Hab.—Mackay, Q. (Turner; ♂♀ in cop.).

The colour in the male is most variable, the yellow markings in some specimens being almost entirely absent, and in others more extensive than in the type.

44. T. (Aeolothynnus) polybioides, n.sp.

♂. Clypeus rather strongly convex, produced, and broadly truncate at the apex. Head and thorax finely and closely punctured; the anterior margin of the pronotum straight and rather strongly raised; the scutellum sparsely punctured. Median segment rounded, very finely and shallowly punctured, smooth at the extreme base. Abdomen slightly fusiform, the segments not much constricted, segments 2-4 with a lightly impressed transverse line near the base, the apical margin narrowly depressed. Hypopygium truncate at the apex, with an apical spine. Black; the mandibles, clypeus, a minute spot at the base of each antenna, the margins of the pronotum broadly, narrowly interrupted in the middle on the anterior margin, a large spot on the mesopleuræ below the anterior wings and a smaller one above the

base of the posterior coxæ, the tegulæ, a quadrate spot on the mesonotum, a large spot in the middle and a small one at each of the anterior angles of the scutellum, the postscutellum, a broad curved mark on each side of the median segment, a broad band narrowly emarginate posteriorly on the second abdominal segment, an interrupted band on the first, third and fourth segments, a large spot on each side of the fifth, a triangular spot at the apex of the first ventral segment and a band emarginate posteriorly on ventral segments 2-4 yellow; the legs ferruginous. Wings hyaline, nervures fusco-ferruginous. Length 10 mm.

Hab.—S. Australia; Wimmera, Vic. (French). Type in Brit. Mus.

45. T. (Aeolothynnus) optimus Sm.

Thynnus optimus Sm., Cat. Hym. B.M. vii. p.29, n.74, 1859(♂).

♂. Clypeus moderately produced, rather broadly truncate at apex, narrowly truncate at base. Head and thorax finely and closely punctured; interantennal prominence emarginate and not much developed; scutellum sparsely punctured; median segment almost smooth, much longer than broad. Abdomen elongate, flattened; segments 2-5 with a very faint transverse line near base and the apical margin slightly depressed, most broadly so in middle; hypopygium narrowly truncate at apex, with an apical spine.

Hab.—Swan River, W.A. (Smith).

46. T. (Aeolothynnus) sulcatus Sm.

Thynnus sulcatus Sm., Cat. Hym. B.M. vii. p.42, n.117, 1859(♀).

♀. Head a little broader anteriorly than long, slightly narrowed posteriorly, smooth and shining, the front broadly prominent, with a deep depression on each side, vertex sparsely punctured. Pronotum much broader than long, subrectangular. Second abdominal segment with four transverse carinæ, including the recurved apical margin. Pygidium lanceolate, sides of the hypopygium expanding a little towards apex.

Hab.—Swan River.

A specimen, apparently the type, in the British Museum is in very bad condition and does not admit of any detailed description.

47. T. (Aeolothynnus) jardinei, n.sp.

♂. Clypeus short, produced anteriorly and rather broadly truncate at apex. Head and thorax very finely and closely punctured; anterior margin of pronotum raised and straight; scutellum broadly truncate at apex. Median segment shining, rounded, and more sparsely punctured. Abdomen elongate, slender; segments 2-5 with an impressed line near base above and beneath, apical margin depressed, with a raised mark slightly emarginate in middle just before it; ventral segments 3-5 subtuberculate at apical angles. Hypopygium ending in an elongate triangular spine with a short spine on each side of base. Black; mandibles except extreme apex, clypeus, a large spot between antennæ, margins of pronotum, united in middle, tegulæ and a small spot above them, a quadrate spot on mesonotum, a large spot on scutellum and a small one at each of its basal angles, postscutellum, mesopleuræ, apex and sides of median segment, a broad transverse band close to apical margin of the first five abdominal segments above and beneath, narrower on fourth and fifth segments beneath, sixth dorsal segment and legs yellow; scape of antennæ and epipygium fulvous. Wings iridescent hyaline, nervures black, stigma ferruginous. Length 9 mm.

Hab.—Cape York, Q. (Turner).

48. T. (Aeolothynnus) bembeculus, n.sp.

♂. Clypeus broad and short, rather narrowly produced and truncate at apex. Head finely punctured-rugose. Thorax and median segment finely and closely punctured; pronotum short and depressed, anterior margin not elevated; scutellum rather prominent, with a depressed transverse row of punctures at base; median segment rounded, much broader than long. Abdomen elongate, depressed at apex, apical margin of segments 2-5 very narrowly depressed, the same segments with a feebly impressed, transverse line near base. Hypopygium triangular, produced

into an acute spine. Black, with white pubescence on head and thorax; clypeus, mandibles except at apex, two short oblique lines between antennæ, margins of pronotum narrowly, tegulæ and an oblique line above them, a longitudinal median line on posterior half of mesonotum, a spot in middle and one at each of the anterior angles of scutellum, a transverse line on postscutellum and an oblique spot on each side of it, a small spot near middle of median segment, a rather larger one at apex and one on each side, three small spots on mesopleuræ, a transverse spot on each side of first abdominal segment and an interrupted narrow band near apical margin of segments 2-6 above and beneath emarginate posteriorly creamy-white; pronotum, disc of mesonotum and scutellum, mesopleuræ and legs ferruginous. Length 9 mm.

Hab.—Cooktown, Q. (Turner).

Taken in October flying with a colony of Bembex.

It seems to be allied to *T. excellens* Sm., but there are many points of difference.

49. T. (Aeolothynnus) productus, n.sp.

♂. Clypeus short, produced and rather broadly truncate anteriorly; interantennal prominence raised on each side into an elevated carina on inner side of scape of antennæ. Head finely punctured-rugose, with grey pubescence on front. Thorax and median segment closely punctured, scutellum broad and short, median segment depressed. Abdomen elongate-fusiform, finely and sparsely punctured, segments 2-5 with a very feebly impressed transverse line near base. Hypopygium produced into an elongate spine, stout at base, with a small spine on each side. Black; mandibles, clypeus, interantennal carinæ, margins of pronotum, tegulæ and a line above them, mesopleuræ in front, a quadrate mark on mesonotum, a transverse spot on scutellum and a small one at each of its basal angles, postscutellum, a spot at apex of median segment and a longitudinal mark on each side of it, a narrow curved band strongly emarginate posteriorly on each side of first abdominal segment, a broader band on segments 2-6 narrowly interrupted in middle and emarginate on apical margin

on each side and an interrupted band on segments 2-5 beneath pale yellow; legs, except coxæ and trochanters pale ferruginous. Wings hyaline, nervures black, stigma testaceous. Length 9 mm.

Hab.—N.W. Australia (French).

50. T. (Aeolothynnus) coloratus, n.sp.

♂. Clypeus short, rather broadly truncate at apex and finely punctured. Head finely and closely punctured, interantennal prominence broadly V-shaped. Thorax finely and closely punctured; pronotum with anterior margin raised, obliquely truncate in middle below the raised margin, causing the segment to appear broadly emarginate anteriorly. Median segment much broader than long, rounded, very closely and finely punctured, with a smooth mark on each side at base. Abdomen elongate, finely and shallowly punctured; segments 2-5 with an impressed transverse line near base, and apical margin very narrowly depressed. Hypopygium ending in three acute spines, the central spine much the longest. Black; mandibles, clypeus, an oblique line on each side between antennæ, pronotum with a small black spot on middle and a large one on each side, a quadrate spot on mesonotum, tegulæ, a large spot on mesopleuræ beneath anterior wing and another smaller one behind it, middle of scutellum and a spot at each of anterior angles, a longitudinal mark from apex of median segment reaching beyond middle, with a large spot on each side at apex, a narrowly interrupted transverse band near apex of the six basal abdominal segments above and a spot at apex of coxæ bright yellow; legs, except coxæ and trochanters pale ferruginous marked with yellow. Wings hyaline, nervures fuscous. Length 9-10 mm.

♀. Head small, smooth and shining, rather broader anteriorly than long, much narrowed posteriorly; with a deep and large excavation on each side from eye to base of antennæ, reaching much higher than eye. Thorax very narrow; pronotum much longer than broad, with a strong, longitudinal, median carina. Median segment very short, obliquely truncate from just behind mesonotum. Abdomen smooth, much broader than thorax;

apical margin of first segment depressed, with a transverse carina before it; second segment with four transverse carinæ, including the raised apical margin; segments 3-5 with a feebly raised, curved mark on each side before apical margin. Pygidium very narrow, deflexed posteriorly and very slightly widened to apex. Pale ferruginous-brown, posterior half of pronotum, mesonotum, dorsal segments of abdomen, except the raised marks and carinæ, and tibiæ pale testaceous-yellow. Length 4-5 mm.

Hab.—Mackay, Q. (Turner; ♂♀ in cop.).

51. T. (Aeolothynnus) tasmaniensis Sauss.

Thynnus (*Agriomyia*) *tasmaniensis* Sauss., Reise d. Nov. Zool. ii. 1, Hym. p. 119, n. 6, 1867(♂).

♂. Saussure's description is sufficient. All specimens I have seen from the mainland have yellow marks on the fifth segment of the abdomen as well as on the four basal segments.

♀. Head subquadrate, very slightly narrowed behind eyes, smooth and shining, with a depression on each side between eye and base of antennæ which are inserted very near together. Thorax and median segment smooth and shining; pronotum a little narrower than head, rather broader than long, depressed anteriorly, centre raised and subtuberculate. Mesonotum very narrow; median segment broadened from base, obliquely truncate posteriorly, angles at base of truncation rounded, surface of the truncation delicately punctured. First abdominal segment raised on apical margin, with a groove before it, giving the appearance of a transverse carina before apex; second segment with three transverse carinæ and apical margin raised; segments 3-5 delicately aciculated at base, sparsely punctured at apex, with a slightly raised curved mark on each side before apical margin. Pygidium lanceolate, epipygium very narrow and deflexed to apex, margins of hypopygium reflexed near apex, causing a slight widening of pygidium. Ferruginous; abdomen stained with fuscous-brown. Length 5-6 mm.

Hab.—Tasmania (Saussure); Sydney, N. S.W.

Type of ♀ in Oxford University Museum.

52. T. (Aeolothynnus) conjungens, n.sp.

♂. Very near *T. tasmaniensis* Sauss., from which it differs in having a delicate carina on the basal portion of the clypeus. There is an interrupted yellow band on the fifth and sixth as well as on the four basal abdominal segments; the nervures of the wings are paler. It is also a smaller species. Length 9 mm.

♀. Head smooth and shining, much longer than broad, rounded at posterior angles, sides nearly parallel, eyes rather prominent. Thorax very narrow, almost smooth; pronotum about twice as long as broad, sides nearly parallel, raised and subterculate in middle near posterior margin, with a few setigerous punctures on anterior margin. Median segment very short and narrow, obliquely truncate posteriorly. The abdomen is damaged, but the pygidium does not differ from that of *T. tasmaniensis*, nor apparently does the rest of the abdomen. The colour is entirely testaceous, but the specimen is probably immature. Length 4 mm.

Hab.—Mackay, Q. (Turner; ♂♀ in cop.).

I should have regarded the male merely as a local form of *T. tasmaniensis*, but the shape of the head and thorax of the female is very different.

53. T. (Aeolothynnus) zelebori Sauss.

Thynnus (*Agriomyia*) *zelebori* Sauss., Reise d. Nov. Zool. ii. 1, Hym. p. 117, n. 2, 1867(♂).

Saussure's description of the male is sufficient.

♀. Head smooth and shining, much longer than broad, the sides strongly compressed and concave, antennæ inserted close together, eyes touching base of mandibles. Thorax and median segment sparsely and finely punctured; pronotum rectangular, a little longer than broad, with a longitudinal sulcus on each side, leaving a raised area in centre, the lateral margins rather irregularly raised. Median segment short, narrow at base, broadened and obliquely truncate posteriorly. Abdomen rather broader than thorax; first segment depressed on apical margin, leaving a

curved carina before apex; second segment with five transverse carinæ, including the raised apical margin; the remaining segments sparsely punctured. Pygidium lanceolate, the lateral margins raised and diverging slightly to apex, with a tuft of hairs on each side. Black; head, prothorax and legs ferruginous. Length 7 mm.

Hab.—Sydney (Saussure); Blue Mts., Woodford (Waterhouse); Leura (Froggatt; ♂♀ in cop.).

Allied to *T. truncatus* Sm.

54. T. (Aeolothynnus) truncatus Sm.

Thynnus (*Agriomyia*) *truncatus* Sm., Cat. Hym. B.M. vii. p.38, n.100, 1859(♂).

♂. Clypeus long, rather narrowly truncate anteriorly, punctured, pointed at base and almost touching interantennal prominence, which is rounded at apex and not much developed; a short, delicate longitudinal carina on front, extending onto base of clypeus. Head and thorax closely and finely punctured; anterior margin of pronotum slightly raised, with a groove behind it; scutellum subtriangular, depressed at base, prominent at apex, sparsely punctured, with an almost obsolete median carina from near base to apex. Median segment rounded, very finely punctured, almost smooth at base. Abdomen elongate, shining, almost without punctures; segments 2-5 moderately constricted near base, apical margin narrowly depressed, leaving a raised area emarginate in middle just before margin. Hypopygium truncate at apex, with a short apical spine; sometimes with the angles slightly prominent. Black; margin of clypeus at sides, a spot at base of mandibles, a short narrow line on each side of anterior margin of pronotum, absent in some specimens, and a transverse line on postscutellum creamy-white. Wings hyaline, nervures black. Length 10-11 mm.

Hab.—Lower Plenty (Bakewell); Victoria (French).

The type is lost.

55. T. (Aeolothynnus) iridipennis Sm.

Thynnus (*Agriomyia*) *iridipennis* Sm., Cat. Hym. B.M. vii. p.38, n.99, 1859(♂♀).

Thynnus strangulatus Sm., Descr. n.sp. Hym. p.166, n.22, 1879(♂♀).

♂. Clypeus produced and rather narrowly truncate at apex, strongly punctured, with a short carina from base not reaching centre. Head shining, very closely punctured. Thorax shining, finely and sparsely punctured, anterior margin of pronotum straight and raised; scutellum strongly elevated in centre, oblique anteriorly. Median segment smooth and shining at base, finely punctured at apex. Abdomen elongate, segments constricted at base, the apical margin very narrowly depressed; sparsely punctured and shining. Epipygium narrow at apex, the apical margin slightly raised; hypopygium ending in a slightly recurved apical spine.

♀. Head smooth and shining, with a few punctures on front, a little broader anteriorly than long, narrowed behind eyes, clypeus with a median carina. Thorax finely and sparsely punctured; pronotum nearly twice as broad anteriorly as long, a little narrowed posteriorly. Median segment smooth, oblique from mesonotum. Abdomen almost smooth; second segment with four transverse carinæ, including the raised apical margin. Pygidium narrow, the sides, as far as can be seen, nearly parallel.

Hab.—Adelaide, S.A. (Smith); Lower Plenty, Vic. (Bakewell).

The type of *T. iridipennis* is lost, but a male in the British Museum answers well to the description, and does not differ appreciably from the type of *T. strangulatus*, except in the coloured markings. Smith says that the female of *T. iridipennis* has only two carinæ on the second abdominal segment, but the basal carina in the allied species is so often covered by the apex of the first segment that he might easily have been mistaken. The type of the female of *T. strangulatus* is damaged on the abdomen.

56. T. (Aeolothynnus) dispersus, n.sp.

♂. Clypeus narrowly truncate at apex, smooth, finely punctured at base. Head and thorax closely punctured; anterior margin of pronotum straight and slightly raised; scutellum not much elevated. Median segment shining, almost smooth at base, delicately transversely-rugulose at apex. Abdomen elongate, finely punctured; the segments smooth at base and slightly constricted, apical margin narrowly depressed. Hypopygium subtruncate at apex, angles slightly produced but not forming spines, apical spine acute. Black; clypeus except base and centre, two minute spots between antennæ, margins of pronotum, tegulæ, a spot on scutellum, postscutellum, a small spot on mesopleuræ, another at base of intermediate coxæ, a small spot on each side of first abdominal segment and a transverse spot on each side of the four following segments close to apical angles pale yellow; tibiæ ferruginous. Wings hyaline, iridescent, nervures fuscous, stigma ferruginous. Head and thorax with thin grey pubescence. Length 8 mm.

Hab.—Victoria (French).

Allied to *T. iridipennis* Sm.

57. T. (Aeolothynnus) collaris Guér.

Lophocheilus collaris Guér., Mag. de Zool. xii. p.13, 1842(♂).

?*Tachynomyia nitens* Sauss., Reise d. Nov. Zool. ii. 1, Hym. p.125, n.2, P.4, fig.65, 1867(♂).

♂. Clypeus narrowly produced and truncate at apex. Median segment delicately transversely rugulose. Fourth and fifth abdominal segments the widest; hypopygium elongate, narrowly truncate at apex, with a fairly long apical spine. Saussure mentions a spine on each side of the apical spine, but although I have seen the angles slightly produced in one specimen, they could not be said to form spines. In the specimens I have seen the yellow band on the posterior margin of the pronotum is only developed on the sides. Guérin's description is very poor and I am doubtful as to the correctness of my determination. Length 9 mm.

Hab.—Victoria (French).

A specimen from the Blue Mts., has the wings fusco-hyaline and measures 11 mm.

58. T. (Aeolothynnus) rostratus, n.sp.

♂. Clypeus much produced, truncate at apex, finely punctured, with a delicate, short carina at base, and a shining line from end of carina to apex. Head finely and closely punctured, with a narrow shining line from anterior ocellus to base of clypeus. Thorax and median segment delicately punctured; pronotum narrower than head, with the anterior margin straight and raised; median segment short and obliquely depressed. Abdomen elongate-fusiform, finely and sparsely punctured; segments 2-5 with an impressed transverse line near base, apical margin narrowly depressed, leaving a raised transverse mark before apex. Hypopygium truncate at apex, with a short spine. Black; abdomen piceous; margins of clypeus at sides, two small spots between antennæ, base of the mandibles, margins of pronotum, tegulæ, a small spot on scutellum, a transverse line on post-scutellum, and a spot on each side of second, third and fourth abdominal segments pale dull yellow. Legs fusco-ferruginous. Wings hyaline, nervures brown. Length 10 mm.

Hab.—Victoria (French).

59. T. (Aeolothynnus) arenicolus, n.sp.

♂. Clypeus very long, produced into a beak, narrowly truncate at apex, punctured and with an obscure carina from base to apex, strongly convex. Head, thorax and median segment finely and closely punctured; a shallow sulcus reaching from below anterior ocellus to base of clypeus. Median segment rounded, almost smooth at base. Abdomen elongate, very sparsely punctured; segments 2-5 with an impressed transverse line near base; epipygium subtruncate, apical angles prominent. Second and third ventral segments tuberculate at apical angles. Hypopygium ending in a long and stout black spine, with a small white spine on each side at its base. Black; mandibles at base, lateral

margins of clypeus, margins of pronotum, tegulæ, a spot on scutellum, postscutellum, a spot on each side near apex of the median segment and a transverse spot on each side of the five basal abdominal segments near apical margin dull testaceous-yellow. Wings hyaline, nervures black, stigma testaceous. Length 8 mm.

Hab.—Killalpanima, S.A., east of Lake Eyre (H. J. Hillier). Type in Brit. Mus.

60. T. (Aeolothynnus) combustus Sm.

Thynnus (*Agriomyia*) *combustus* Sm., Cat. Hym. B.M. p.32,n.83, 1859(♂).

♂. Clypeus very much produced, subtriangular, rather narrowly truncate at apex. A delicate longitudinal carina from a little below anterior ocellus to base of clypeus. Head and thorax closely and finely punctured, pronotum a little narrower than head, the anterior margin elevated; scutellum prominent; median segment short and obliquely depressed, shining and very delicately punctured. Abdomen shining with minute punctures, slender, third segment a little the broadest; segments 2-5 constricted at base, with the apical margin slightly depressed. Hypopygium broadly rounded at apex, with a short apical spine.

Hab.—Adelaide, S.A.

61. T. (Aeolothynnus) pavidus Sm.

Thynnus pavidus Sm., Descr. n.sp. Hym. p.166, 1879(♂♀).

♂. Clypeus broad and short, narrowly produced and truncate anteriorly, closely punctured. Head rugulose; interantennal prominence bilobed, with a very short and delicate median carina. Thorax finely and closely punctured; scutellum rather prominent, with a depressed, transverse row of large punctures at base. Median segment very delicately transversely striated, almost smooth at base, with a longitudinal sulcus from base not quite reaching apex. Abdomen elongate-fusiform, shining, very shallowly punctured; segments 2-5 with a faintly impressed transverse line near base and a slightly raised curved mark on

each side before apex. Hypopygium ending in three spines, the central spine long and curving upwards at apex, the other spines short. There is a ferruginous spot on each side of the vertex, otherwise the colour is well described by Smith.

♀. Head a little longer than broad, smooth and shining, strongly convex, the sides compressed anteriorly and concave. Thorax and median segment narrower than head, sparsely punctured; pronotum a little broader than long; median segment oblique from mesonotum. Abdomen sparsely punctured, second segment with four well marked transverse carinæ, including the recurved apical margin. Pygidium narrow, lanceolate, truncate posteriorly, the margins raised. Length 7 mm.

Hab.—S. Australia (Smith).

62. T. (Aeolothynnus) excellens Sm.

Thynnus excellens Sm., Descr. n.sp. Hym. p.163, n.14, 1879(♂).

♂. Clypeus broadly truncate at apex, moderately produced, convex, with a delicate carina from base to middle, broadly connected with the interantennal prominence which is emarginate anteriorly and not much developed. Head delicately rugulose, with a short, fine, longitudinal carina between antennæ. Thorax finely and closely punctured; anterior margin of pronotum straight and slightly raised; scutellum prominent at apex, obliquely depressed from middle to base, with a transverse row of large punctures at extreme base. Median segment rounded, delicately rugulose, almost smooth at base. Abdomen elongate, almost smooth; segments 2-5 depressed at base above and below; hypopygium ending in a long, slightly recurved spine, with a very short spine on each side. Wings hyaline, nervures testaceous at base, black at apex.

Hab.—Swan River, W.A. (Smith).

63. T. (Aeolothynnus) excelsus, n.sp.

♂. Clypeus moderately produced, narrowly truncate at apex, with a delicate carina from base to middle, connected by a narrow carina with the interantennal prominence which is not emarginate.

Head closely and deeply punctured, the carina from the clypeus continued on front, not reaching anterior ocellus; front and clypeus clothed with short white pubescence. Thorax and median segment closely punctured, scutellum prominent at apex, obliquely depressed at base. Abdomen elongate, sparsely and shallowly punctured, segments 2-5 with an impressed transverse line near base; hypopygium with a long apical spine and a short spine on each side. Black; disc of mesonotum, apex of scutellum and the six apical abdominal segments ferruginous; mandibles except at apex, clypeus except the carina, two short oblique lines between antennæ, margins of pronotum, tegulæ, a small spot on mesopleuræ, a longitudinal line from middle of mesonotum to posterior margin and one on each side reaching from tegulæ to angles of scutellum, a spot in middle and one on each side at anterior angles of scutellum, margin of scutellum at sides, postscutellum, a transverse mark in middle of median segment narrowly connected with a spot at apex, a transverse mark on each side of the first five abdominal segments near the apical margin and a spot at apex of femora creamy-white. Length 10 mm.

Hab.—Port Darwin (Walker). Type in Brit. Mus.

Very near *T. excellens* Sm., but the clypeus is much narrower at the apex, the head and thorax are much more strongly sculptured and the abdominal segments are not as strongly depressed at the base. There is much more pubescence on the head and thorax, and the colour differs considerably.

64. T. (Aeolothynnus) dimidiatus Westw.

Thynnus (*Thynnoides*) *dimidiatus* Westw., Arc. Ent. ii. 2, p.121, P.76, fig.5, 1844(♂).

Thynnus heinricheri D.T., Cat. Hym. viii. 108, 1897.

♂. Anterior margin of pronotum straight, as broad as head; median segment rounded, a little broader than long. Abdomen elongate; hypopygium ending in three long, acute spines, the central spine very long and slightly recurved. Black; abdomen except the basal segment ferruginous.

Hab.—Albany, W.A. (Westwood).

65. T. (Aeolothynnus) crabroniformis Sm.

Thynnus (*Agriomyia*) *crabroniformis* Sm., Cat. Hym. B.M., p.37, n.97, 1859(♂).

♂. The type has the second abdominal segment shining and sparsely punctured; and the median segment is wholly black, differing in these particulars from all the specimens I have taken in the Cairns district, of which I give a description. The species closely resembles a Cerceris.

Var. opaciventris, n.var.

♂. Clypeus produced and rather narrowly truncate at apex; coarsely punctured. Head and thorax opaque, punctured rugose, scutellum punctured, short and strongly convex, broadly truncate at apex. Median segment shining, finely and closely punctured, with a smooth patch on each side at base. Abdomen fusiform, very closely punctured, with fine pubescence on apical half of all the segments except the basal and apical; basal segment shining, smooth, with a few large punctures at extreme apex, and with a sulcus from base not reaching apex; segments 2-5 constricted at base. Epipygium rugose, subtruncate at apex, the margin slightly raised, with prominent angles. Hypopygium rather narrow at apex, with a stout apical spine between two small spines. Black; sides of the clypeus, interior margin of eyes broadly, a spot at base of each antenna, anterior margin of pronotum narrowly interrupted, tegulæ, a spot on mesopleuræ, a small spot in the centre and one at each of the anterior angles of scutellum, post-scutellum, a longitudinal spot at apex and a spot on each side of median segment, first abdominal segment, a spot on each side of second, the whole of fifth and sixth segments and the posterior tibiæ and tarsi yellow; first abdominal segment in middle and at apex, antennæ, anterior and intermediate tibiæ and tarsi and apex of posterior tibiæ ferruginous. Wings hyaline, faintly tinged with yellow, nervures ferruginous. Length 10-12 mm.

♀. Clypeus narrowly advanced and with a carina from base. Head finely and sparsely punctured, with a strongly longitudinal sulcus between antennæ, strongly rounded at posterior angles,

nearly twice as broad in front as long. Pronotum much narrower than head, almost smooth, narrowed posteriorly, as long as the breadth on the anterior margin, which is straight, the surface flattened, with a longitudinal median carina and the lateral margins slightly raised, the anterior angles subtuberculate and with a few long hairs. Median segment punctured, very short, obliquely truncate posteriorly. Abdomen much broader than thorax, sparsely punctured; first segment with a carina before apex, a fringe of long hairs springing from below carina; second segment with three transverse carinæ and the apical margin raised; the three following segments with a raised curved mark on each side before the depressed apical margin. Pygidium narrow, truncate posteriorly, with a longitudinal median carina not reaching apex, lateral margins raised, a little expanded at apex. Pale ferruginous; the front of head, third and fourth abdominal segments at apex and posterior tibiæ pale yellow; median segment and base of third, fourth and fifth abdominal segments black. Length 6-7 mm.

Hab.—Cairns, Q. (Turner; ♂♀ in cop.).

The type has no definite locality attached, but probably is from a more southern locality than the variety. The colour is utterly unreliable in both sexes of the variety; I have taken a male in which the vertex, mesonotum, third abdominal segment and the base of the fourth alone are black. The clypeus in the variety is a little more produced than in the type.

A variety somewhat intermediate between this form and the type has been named *Thynnus praepes* by Colonel Bingham (MS.). These forms may prove to be distinct species when the females are discovered, but in the meantime it is better to treat them as varieties.

66. T. (Aeolothynnus) bipartitus, n.sp.

♂. Clypeus short, truncate at apex and closely punctured; interantennal prominence not much developed, connected with base of clypeus by a narrow carina. Head, thorax, and median segment finely and closely punctured; scutellum elevated and

strongly convex, broadly truncate at apex; median segment rounded, with a smooth area on each side near base. Abdomen shining with a few scattered punctures; segments 2-5 with an impressed transverse line near base; second and third segments more strongly depressed at the base than the others; the apical margin of all the segments narrowly depressed, most broadly in middle. Hypopygium ending in three acute spines, the central spine stout at base and much the longest. Black; base of mandibles, clypeus except a small black spot before apex, margins of pronotum, tegulæ, mesopleuræ in front, a longitudinal spot in middle of posterior half of mesonotum, a spot on each side at anterior angles of scutellum, postscutellum, a curved spot on sides of median segment and a small spot at apex, a spot on each side of first abdominal segment, a narrow transverse band on each side of the five following segments, broadly interrupted on second, narrowly on the others, and a spot on each side of segments 2-5 beneath dull yellow; tibiæ and tarsi ferruginous, the tibiæ marked with pale yellow. Wings hyaline, nervures black, stigma ferruginous. Length 13 mm.

♀. Head sparsely punctured, longer than wide, much narrowed posteriorly, strongly flattened, the antennæ inserted far apart, the front between them bilobed, a smooth and slightly convex area in middle above base of antennæ, eyes situated close to base of mandibles, margins of the head rather broadly expanded below them. Thorax sparsely punctured; pronotum longer than broad, with a strongly raised blunt tubercle in middle, anterior margin straight, with a few large setigerous punctures, the angles subtuberculate. Median segment more closely and finely punctured, obliquely truncate posteriorly. Abdominal segments aciculated at base, very sparsely punctured at apex; first segment truncate anteriorly, the apical margin slightly raised, with a broad groove before it, giving the appearance of a transverse carina before apex; second segment with five strong transverse carinæ, including the raised apical margin. Pygidium narrow, lanceolate, the sides parallel, with a longitudinal carina and with a tuft of golden hairs on each side before apex. Ventral seg-

ments very strongly punctured, almost smooth at base. Entirely fuscous. Length 7 mm.

Hab.—Cairns and Mackay, Q. (Turner; ♂♀ in cop.).

67. T. (Aeolothynnus) cygnorum, n.sp.

♂. Clypeus short and truncate at apex; a short, oblique carina on each side above and between the base of the antennæ. Head, thorax and median segment finely and closely punctured; anterior margin of pronotum straight; scutellum elevated and strongly convex, subtriangular, and narrowly truncate at apex. Abdomen elongate, rather sparsely punctured; segments 2-5 with an impressed transverse line near base, the apical margin of the same segments slightly and very narrowly depressed, second and third segments more strongly depressed at base than the others; apical margin of basal segment narrowly depressed, most broadly so in middle. Hypopygium narrowly subtruncate at apex, apical angles slightly produced, apical spine very strong. Black; base of mandibles, clypeus, except a large black spot in centre narrowly continued to base, interantennal carinæ, margins of pronotum, tegulæ, a very small spot in centre of scutellum, a spot on each side of first abdominal segment, a narrow transverse band on each side of the three following segments above and beneath, and on fifth segment above pale dull yellow; legs, except coxæ and trochanters, ferruginous. Wings hyaline, tinged with fuscous, nervures black, stigma ferruginous. Length 12 mm.

Hab.—Champion Bay, W.A. (Du Boulay). Type in Brit. Mus.

Closely allied to *T. bipartitus.*

68. T. (Aeolothynnus) quadratus Sm.

Thynnus quadratus Sm., Cat. Hym. B.M. vii. p. 42, n. 116, 1859 (♀).

♀. Head subrectangular, much broader than long, almost smooth, and hardly at all convex. Pronotum depressed anteriorly, nearly twice as broad as long, sparsely punctured, with a longitudinal carina from middle to posterior margin and a few long hairs at anterior angles. Median segment closely and finely punctured, almost vertically truncate posteriorly. Abdomen

almost smooth; first segment with a raised curved mark on each side before apex; second segment with three transverse carinæ and the apical margin slightly raised. Pygidium very narrow, deflexed and very slightly widened to apex.

Hab.—N.W. Coast of Australia.

The type is in very poor condition.

69. T. (Aeolothynnus) sannæ, n.sp.

♂. Clypeus broad, not very much produced, broadly subtruncate at apex, strongly convex, coarsely punctured and with an obscure carina from base to apex. Thorax and median segment closely and finely punctured; anterior margin of pronotum straight, and not elevated; scutellum sparsely punctured, with a depressed row of deep punctures at its base; median segment rounded and narrowed to apex. Abdomen shining, the segments very finely and shallowly punctured at base, almost smooth at apex; first segment obliquely truncate anteriorly, with a median sulcus from base not reaching apex; segments 2-5 strongly constricted at base, apical margin very narrowly depressed, leaving a slightly raised curved mark, emarginate in middle, before apex; sixth segment at apex and epipygium rugose, epipygium broadly truncate at apex, the apical angles prominent. Ventral segments 2-6 depressed at apex, leaving a carina very broadly emarginate posteriorly before apex, the carina on third and fourth segments forming a small tubercle at each of the apical angles; produced on the sixth segment into a long acute spine and on the sixth into a minute spine on each side. Hypopygium subtruncate at apex, apical angles slightly produced, with a short apical spine. Black, with grey pubescence; margin and sides of clypeus, margins of pronotum narrowly interrupted in centre of anterior margin, a narrow longitudinal mark on disc of mesonotum posteriorly, tegulæ, a small central spot on scutellum and the margin at the sides, a transverse line on postscutellum, a small spot on each side of first abdominal segment and a narrow transverse band on each side of the four following segments creamy-white; fore tibiæ and all the tarsi fusco-ferruginous. Wings hyaline,

tinged with yellow, nervures black, stigma ferruginous. Length 14 mm.

♀. Head smooth and shining, strongly convex, narrowed anteriorly, rather broader on posterior margin than long; eyes small and round, situated at some distance from base of mandibles, with which they are connected by a carina, antennæ close together at base, clypeus with a carina from base to apex. Pronotum a little broader than head, broader than long and slightly narrowed posteriorly, opaque, with a longitudinal median carina produced into an acute tubercle posteriorly. Median segment narrow at base, shining, flattened above and smooth, obliquely truncate posteriorly and shallowly punctured. Abdomen shining, very finely and sparsely punctured; first segment slightly depressed on apical margin; second segment with three strong transverse carinæ in middle and several delicate transverse striations before apical margin, which is very slightly raised. Pygidium vertically truncate posteriorly, the sides parallel and slightly raised, truncate at apex, more than twice as long as broad; epipygium very much shorter than hypopygium. Fifth ventral segment rugose. Black; mandibles, antennæ and legs fuscous; abdominal segments testaceous on sides. Length 8 mm.

Hab.—Cape York, Q. (Turner; ♂♀ in cop.).

The labrum of the male is longer than in most of the genus and is moderately bilobed. The female has the tarsal ungues bidentate.

70. T. (Aeolothynnus) bidentatus Sm.

Thynnus (*Agriomyia*) *bidentatus* Sm., Cat. Hym. B.M. vii. p.32, n.82, 1859(♂).

♂. Clypeus not very much produced, rather broadly truncate at apex. Thorax and median segment closely and shallowly punctured, most finely on median segment, which is rounded. Abdomen shining, segments 2-5 divided by an impressed transverse line, the apical margins very narrowly depressed, leaving a raised, curved mark, deeply emarginate in middle, just before apex. Ventral plates of segments 2-5 deeply emarginate, slightly

produced at the apical angles of third and fourth segments, produced into a long acute spine at the apical angles of the fifth segment. Hypopygium lanceolate, without an apical spine.

Hab.—Swan River, W.A. (Smith).

Var. ORIENTALIS, n.var.

♂. A delicate longitudinal carina from base of clypeus half way to anterior ocellus. Clypeus entirely black. The yellow marginal bands of the pronotum united and narrowly interrupted in middle; the yellow spots on abdomen much smaller than in the typical form.

This variety is a little larger and more robust than the type, and appears to be constant.

Hab.—Wimmera, Vic. (French).

71. T. (AEOLOTHYNNUS) DODDII, n.sp.

♂. Clypeus not much advanced, broadly and slightly emarginate anteriorly; labrum exposed, feebly bilobed; a faint depressed transverse line on clypeus before apex. Head delicately and very closely punctured; thorax more sparsely punctured, the punctures larger than those on head. Pronotum depressed, the anterior margin raised, a little narrower than head. Scutellum rather broadly truncate at apex; median segment smooth. Abdomen narrow, flattened, the segments of about even width, strongly depressed at base of each segment; second and third segments with a strongly raised mark, emarginate in centre, just before apical margin. Hypopygium subtriangular, narrowly truncate at apex, with a short apical spine. Segments 2-5 strongly produced at apical lateral angles beneath, fifth produced into a long spine on each side. Black; mandibles, except at apex, clypeus, margins of eyes, narrowly interrupted at apex, a broad band above base of antennæ, narrowly interrupted in middle, pronotum with the exception of a small black spot in middle and a transverse line on each side, a large square spot on posterior margin of mesonotum, a curved line above tegulæ, tegulæ, mesopleuræ, a large spot on scutellum, and a spot at the anterior

angle on each side, postscutellum, a large horseshoe-shaped mark on each side of and a spot at each basal angle of median segment, an oblique band on each side of abdominal segments 1-6 near apex, the spines on sides of segments and the legs, bright yellow; intermediate and posterior tibiæ and tarsi fusco-ferruginous. Wings hyaline, nervures testaceous. Length 9 mm.

♀. Head convex, broad anteriorly, rounded and narrowed to a neck posteriorly, longer than broad. Pronotum rectangular, longer than broad, the lateral margins elevated, the centre much raised, forming a broad longitudinal carina. Mesonotum rather prominent, median segment very short, obliquely truncate posteriorly. Sides of the thorax and median segment vertical. Abdomen much broader than median segment, all the segments, except second and sixth, depressed on apical margin and in centre, leaving a rounded raised area on each side before apex; second segment with the apical margin raised forming a transverse carina, another transverse carina near base, the intervening space very finely transversely striate. Pygidium lanceolate, obliquely truncate towards apex, where it is very slightly dilated. The whole insect smooth and shining, without punctures. Rufo-testaceous; head, except mandibles and antennæ, the third, fourth and fifth abdominal segments piceous; thorax and median segments fusco-ferruginous. Length 4 mm.

Hab.—Townsville, Q. (F. P. Dodd). Type in the British Museum.

72. T. (Aeolothynnus) clementi, n.sp.

♂. Clypeus short, rather broadly truncate at apex, punctured. Head very closely punctured, with grey pubescence on front. Thorax finely and very closely punctured, rather broad; pronotum as broad as head, the anterior margin scarcely raised; scutellum strongly convex, broadly truncate at apex, more sparsely punctured. Median segment broad and short, very finely and closely punctured, smooth at extreme base. Abdomen shallowly punctured, shorter and broader than in most of the allied species; segments 2-5 slightly constricted at base; third and fourth

ventral segments with the apical angles prominent, fifth ventral segment with a very long and acute spine on each side at apical angles. Epipygium truncate at apex; hypopygium ending in three spines, those at the apical angles very short. Black; clypeus, a spot at base of mandibles, margins of pronotum, a large spot on mesopleuræ, tegulæ, a spot near posterior margin of mesonotum, a spot on middle and one at each of anterior angles of scutellum, a spot on each side at base of median segment near middle and one on each side on the extreme margin not far from apex, a narrowly interrupted band near apex of first abdominal segment, a broader transverse spot on each side of segments 2-5 above, a smaller spot on each side of segments 2-4 beneath, undersurface of spines of fifth segment, and a mark at apex of anterior femora pale dull yellow; tibiæ and tarsi fusco-ferruginous. Wings hyaline, nervures black. Length 14 mm.

Hab.—Nickol Bay, W.A. (Clement). Type in Brit. Mus.

73. T. (Aeolothynnus) eyrensis, n.sp.

♂. Clypeus produced and strongly narrowed anteriorly, forming an elongate beak, narrowly truncate at apex, with a median, longitudinal carina on apical portion, depressed at base and punctured. Labrum prominent and almost pointed at apex. Head rather small, very finely rugulose. Thorax and median segment very finely and closely punctured, pronotum broadly emarginate anteriorly, rather long and quite as broad as head. Scutellum rather narrowly truncate at apex; median segment subtriangular, very narrow at apex, with a depression on each side near basal angles. Abdomen elongate, first segment oblique, not quite as wide at apex as second; segments 2-4 with a depressed transverse line near base, and the apical margin very narrowly depressed. Beneath there is a raised plate on segments 2-6, strongly emarginate and produced at apical angles, forming acute spines on segments 4-6. Hypopygium broad and short, with an apical spine and an acute, slender spine on each side close to apex. Black; clypeus, internal margin of eyes broadly to above base of antennæ, a spot on each side above base of

antennæ, pronotum, a square spot on mesonotum, tegulæ and a curved line above them, mesopleuræ, a spot in middle of scutellum and a small spot at each of anterior angles, a transverse line on postscutellum, sides of median segment, a longitudinal spot on each side at base and a small spot at apex, a broad transverse band on middle of each abdominal segment, the prominent ventral plates beneath and the seventh segment dull cream colour. A large, slightly depressed spot on each side of clypeus near apex and a narrowly interrupted transverse line crossing clypeus from base of mandibles dark brown. A transverse line on sides of pronotum and a small spot in middle, and a broad irregular mark on mesopleuræ black. Legs pale yellow, trochanters and tarsi fuscous, femora at base and tibiæ beneath ferruginous-brown. Wings hyaline, nervures black, stigma testaceous. Length 8 mm.

Hab.—Killalpanima, S.A, 100 miles east of Lake Eyre.

Type in Brit. Mus. (H. J. Hillier).

74. T. (Aeolothynnus) baccatus Sm.

Thynnus (*Agriomyia*) *baccatus* Sm., Trans. Ent. Soc. London, 1868, p.236(♂).

♂. Clypeus broad, slightly produced and truncated at apex where it is not very broad, finely punctured. Head, thorax and median segment very finely and closely punctured; anterior margin of pronotum straight, not elevated; mesothorax rather broad; median segment short, obliquely truncate posteriorly. Abdomen rather strongly punctured, second segment the broadest; segments 2-5 strongly depressed at base above and beneath, segments 3-5 subtuberculate beneath near apical angles; sixth ventral segment with a short spine on each side at apical angles. Hypopygium broad, terminating in three spines, the central spine long and stout. Wings hyaline, nervures black, stigma fuscous.

Hab.—Champion Bay, W.A. (Du Boulay).

75. T. (Aeolothynnus) illustris Kirby.

Rhagigaster illustris Kirby, Horn Exped. Pt. i. 1898.

♂. Clypeus broad and not much produced, broadly truncate at apex, very finely punctured. Head, thorax and median segment very closely and finely punctured, clothed with short, thin, grey pubescence; pronotum as wide as head, broadly emarginate anteriorly, anterior margin not elevated; median segment much broader than long. Abdomen elongate, narrower than thorax, segments 2-4 constricted at base, sixth ventral segment with a spine on each side at apical angles. Hypopygium with three spines at apex, the central spine long and stout. Black; sides and apex of clypeus, a small spot at base of each antenna, margins of pronotum obscurely, postscutellum, a narrow, interrupted, transverse band in middle of first abdominal segment, a large spot on each side of segments 2-5 and a minute spot at apical angles of segments 2-4 beneath creamy-white; the two apical abdominal segments ferruginous. Wings hyaline, faintly iridescent, nervures black. Length 10 mm.

Hab.—Central Australia.

The second recurrent nervure is received at the base of the third cubital cell and is almost interstitial with the second transverse cubital nervure. The third cubital cell is very short along the radial nervure.

76. T. (Aeolothynnus) ablatus, n.sp.

♂. Clypeus produced and rather narrowly truncate at apex, the produced apical portion slightly depressed below basal portion, giving the appearance of a transverse carina; apex smooth, the base finely punctured. Head finely and very closely punctured, interantennal carina not developed. Thorax and median segment finely and closely punctured; anterior margin of pronotum straight; median segment rounded. Abdomen elongate, strongly punctured; segments constricted at base, with the apical margin very narrowly depressed. Sixth ventral segment with a spine at apical angles. Hypopygium broad, ending in three long spines, the central spine the longest. Black; mandibles, clypeus in front,

margins of pronotum, tegulæ, a spot in middle of scutellum and its lateral margins, postscutellum and a transverse spot on each side of the five basal abdominal segments pale yellow; legs, except coxæ, ferruginous. Wings hyaline, nervures black, stigma ferruginous. Length 7 mm.

♀. Head smooth and shining, about as long as broad, very much narrowed posteriorly, the sides compressed and slightly concave. Thorax and median segment smooth and shining; pronotum much narrowed posteriorly, anterior margin straight with prominent angles, surface flat. Mesonotum very small and narrow; median segment narrow at base, broadened and obliquely truncate posteriorly. Abdominal segments strongly punctured, smooth at base and apex, apical margin broadly depressed; first, third and fourth segments with a raised curved mark, emarginate in middle posteriorly; second segment with three transverse carinæ and the apical margin slightly raised. Pygidium elongate, about three times as long as broad, narrowly rounded at apex, the sides parallel. Head, thorax, median segment and legs rufotestaceous; abdomen light ferruginous-brown, margins and sides of the segments testaceous. Length 6 mm.

Hab.—S. Australia. Types in Brit. Mus.

77. T. (Aeolothynnus) cerceroides Sm.

Thynnus (*Agriomyia*) *cerceroides* Sm., Cat. Hym. B.M. vii. p.34, n.87, 1859(♂).

Thynnus perelegans Sm., Descr. n.sp. Hym. p.167, n.25, 1879(♂).

♂. Clypeus strongly convex, moderately produced and truncate at apex. Head closely and strongly punctured; thorax and median segment coarsely punctured, anterior margin of pronotum not elevated. Abdomen shining, sparsely punctured, the segments constricted at base; apical angles of ventral segments 3-5 prominent, sixth ventral segment with a spine on each side at apical angles. Hypopygium truncate at apex and narrow, with an acute apical spine. In some specimens the apical angles of the hypopygium are produced into short spines. Length 7-11 mm.

♀. Head narrow, much longer than broad, produced posteriorly; eyes situated at some distance from base of mandibles which are long and pointed; the front is raised into a prominent ridge with a flattened rugulose surface, and there is a strong depression on each side reaching from eye to base of antenna. Thorax and median segment finely punctured; abdomen shining, with a few scattered punctures. Pronotum rectangular, about half as broad again as long, as broad as head; median segment short, broadened from base, and obliquely truncate posteriorly. First abdominal segment with a raised semicircular mark on each side some distance before apical margin, second segment with three transverse carinæ (possibly others may be concealed by the first segment), the apical margin hardly raised; third and fourth segments with a semicircular raised mark on each side before apical margin; pygidium very narrow, of about even width throughout. Black; mandibles, antennæ, pygidium and legs rufo-testaceous; sides and apical margins of the abdominal segments testaceous. Length 5-6 mm.

Hab.—Sydney; Tempe, N. S. W. (Froggatt)—Mackay; Cairns and Cape York, Q. (Turner; ♂♀ in cop.).

Aeol. perelegans Sm., seems to me to be only a variety with the yellow markings more strongly developed.

78. T. (Aeolothynnus) decipiens Westw.

Thynnus decipiens Westw., Arc. Ent. ii. 105, (note) p. 124, 1844, ♂.

♂. Clypeus not very much advanced, convex at base, depressed and rather narrowly truncate at apex. Head and thorax punctured-rugose; pronotum short, as broad as head, more finely sculptured than head or mesonotum, the anterior margin straight and elevated at sides. Median segment finely and closely punctured, rounded, and narrowed from base, not truncate. Abdomen elongate, strongly punctured, segments 2-5 with a strongly depressed transverse line near base and a small triangular depression in middle of apical margin; apical segment rugose with a median, longitudinal carina; sixth ventral segment with a strong spine on each side at apical angles. Hypopygium ending in

three spines, the central spine much the longest. Black; the two apical segments ferruginous-red. Wings hyaline. Length 9 mm.

Hab.—Tasmania (Westwood).

79. T. (Aeolothynnus) sanguinolentus, n.sp.

♂. Clypeus much produced and rather narrowly truncate at apex, finely and closely punctured. Head punctured, finely and closely on front, shallowly on vertex. Thorax and median segment deeply but not very closely punctured, the punctures large; pronotum very broadly emarginate anteriorly; median segment depressed and subtruncate posteriorly. Abdomen elongate, shining; segments 2-5 constricted near base, with the apical margin depressed in middle, the same segments beneath with the apical angles acutely produced; sixth ventral segment with a spine on each side at apical angles. Hypopygium ending in three spines, the central spine much the longest. Black; anterior margin of clypeus continued along inner margin of eyes as far as base of antennæ, a short line on each side of anterior margin of pronotum, a small spot at base of tegulæ, a spot on postscutellum, and an oblique line on each side of second and third abdominal segments creamy-white; the two apical abdominal segments ferruginous-red. Wings hyaline, nervures black. Length 8 mm.

♀. Head smooth and shining, longer than broad, very strongly compressed and convex, narrowed anteriorly. Thorax and median segment rather sparsely punctured; pronotum as broad as head, broader than long, the punctures on the anterior margin setigerous; median segment very short. Abdomen much broader than thorax, sparsely punctured; first segment broadly depressed along apical margin, with a raised curved mark, emarginate in middle, before the depression. Second segment with three transverse carinæ, the one near apex less elevated than the others; the apical margin is not raised. Third segment broadly depressed at apex, with a slightly raised curved mark, emarginate in middle before the depression. Pygidium very narrow, lanceolate, arched at base, with a longitudinal median carina and the margins

slightly raised. Black ; antennæ, mesonotum, base of first abdominal segment, carinæ on second, the two apical segments and legs ferruginous-brown; apical margins and sides of abdominal segments testaceous. Length 5 mm.

Hab.—Liverpool, N. S.W. (Froggatt; ♂♀ in cop.).

Types in Coll. Froggatt.

A variety of the male has the whole abdomen except the basal segments ferruginous. Allied to *T. decipiens* Westw., but differs in many details both of shape and sculpture.

80. T. (Aeolothynnus) armiger, n.sp.

♂. Clypeus short and broad, narrowly produced and truncate at apex, closely punctured. Head very closely punctured on front, shallowly and more sparsely on vertex. Thorax and median segment finely and closely punctured; anterior margin of the pronotum straight and only slightly raised, rather narrower than head; median segment rounded, with an indistinct longitudinal sulcus from base. Abdomen elongate, shining and shallowly punctured, the segments strongly constricted at base, the apical margin very narrowly depressed, most broadly in middle, leaving the raised portion of the segments narrowly emarginate. Ventral plate of segments 3-5 prominent at apical angles; sixth ventral segment with a spine on each side at apical angles. Epipygium narrowly rounded at apex; hypopygium ending in three acute spines, the central spine the longest. Black; a narrow line on anterior margin of pronotum interrupted in middle, and a transverse line on postscutellum creamy-white; calcaria of tibiæ whitish. Wings hyaline, iridescent, nervures fuscous. Length 9 mm.

♀. Head as broad anteriorly as long, much narrowed posteriorly, shining, with a few scattered punctures, a short sulcus on front between antennæ, clypeus with a strong carina. Pronotum much broader than long, convex, the anterior portion subcarinate, the centre subtuberculate, sparsely punctured. Median segment short, obliquely truncate posteriorly, more closely punctured. Abdomen broader than thorax, strongly pubescent on sides; first

segment with a transverse carina before apex, from beneath which spring long hairs; second segment with five transverse carinæ, including the recurved apical margin; the three following segments strongly punctured on apical portion. Pygidium lanceolate. Fuscous-black; antennæ, legs, second abdominal segment and pygidium fusco-ferruginous. Length 5 mm.

Hab.—Mittagong, N. S.W. (Froggatt; ♂♀ in cop.).

Types in Coll. Froggatt.

81. T. (Aeolothynnus) umbripennis Sm.

Thynnus (*Agrioymia*) *umbripennis* Sm., Cat. Hym. B.M. vii. 31, n.78, 1859(♂).

♂. Clypeus narrowly truncate at apex; interantennal carina straight and transverse, front finely rugose, vertex shining and closely punctured. Thorax opaque, very closely punctured; pronotum broad, slightly emarginate anteriorly; scutellum with a faint longitudinal carina; median segment rugulose, nearly twice as broad at base as long. Abdomen elongate, shining and closely punctured; the segments strongly constricted near base, third and fourth ventral segments subtuberculate at apical angles, fifth and sixth with a spine on each side at apical angles, the spine very short and fine on fifth, stout and longer on sixth. Hypopygium ending in three spines, the middle spine the longest; epipygium subtruncate at apex, the apical angles prominent.

Hab.—Wimmera, Vic. (French).

82. T. (Aeolothynnus) gilberti, n.sp.

♂. Clypeus broadly truncate anteriorly, strongly punctured, convex and rather prominent at extreme base, thence almost vertical to apex, pointed at base and reaching the interantennal carina which is transverse. Front finely punctured-rugose, concavely depressed on sides above antennæ, an oblique carina between eyes, pointed anteriorly; vertex sparsely punctured. Thorax and median segment coarsely punctured, most finely on pronotum. Median segment short, almost vertically truncate posteriorly, the surface of the truncation rugose. Abdomen

short, fusiform; segments 2-4 with an impressed transverse line near the base. Hypopygium rather short, terminating in an apical spine with a very short spine on each side of its base. Black; with sparse grey pubescence; antennæ, anterior tibiæ and tarsi and abdomen except the two basal segments ferruginous; pronotum anteriorly broadly interrupted in middle and a spot on posterior margin of mesonotum yellow. Wings hyaline, nervures black. The antennæ are very short, of about the same length as the mesonotum. Length 8 mm.

♀. Head smooth and shining, broader than long anteriorly, much narrowed posteriorly, slightly convex. Thorax and median segment almost smooth; pronotum flat, narrower than head, broader than long, narrowed posteriorly, the anterior margin straight; mesonotum not very small, rounded posteriorly; median segment oblique from mesonotum, more sharply depressed towards apex. Abdomen broader than thorax, sparsely punctured; first segment with the apical margin depressed; second with five transverse carinæ, including the raised apical margin. Pygidium small, ovate-lanceolate, with a median longitudinal carina, the margins elevated and slightly diverging towards apex which is rounded. Black; antennæ, legs and carinæ on second abdominal segment fuscous. Length 5 mm.

Hab.—Port Darwin (G. Turner; ♂♀ in cop.).

83. T. (Aeolothynnus) aterrimus Sm.

Thynnus aterrimus Sm., Descr.n.sp. Hym. p.164,n.16,1879(♂).

♂. Clypeus subtriangular, narrowly truncate at apex. Head rugose on front, punctured-rugulose on vertex. Thorax and median segment closely and finely punctured; pronotum short, broadly emarginate anteriorly; a depressed, transverse row of large punctures at base of scutellum. Median segment short and broad, rounded at sides. Abdomen broadly fusiform, sparsely punctured; segments 2-5 strongly depressed at base above and beneath. First ventral segment with a very prominent longitudinal carina, deeply separated from second segment. Hypo-

pygium ending in three small spines, the middle spine the longest, lateral spines divergent.

Hab.—Swan River, W.A.(Smith).

84. T. (Aeolothynnus) saundersi, n.sp.

♂. Clypeus rather narrowly produced and very narrowly truncate at apex. Head rugulose on front, punctured on vertex. Thorax punctured-rugulose; pronotum rather broader than head, anterior margin straight and slightly raised. Mesonotum broad and short; scutellum strongly punctured, with a depressed, transverse row of large punctures at base. Median segment very short, obliquely truncate from a little behind the post-scutellum. Abdomen broadly fusiform, sparsely punctured; segments 2-5 strongly constricted near base, apical margin depressed; first segment oblique, with a median sulcus from base not quite reaching apex, subtuberculate at apex beneath; sixth ventral segment with a spine at apical angles. Hypopygium broad, ending in three spines, the central spine the longest, basal angles prominent. Black; mandibles, apical portion of clypeus, a minute spot above base of each antenna, anterior margin of pronotum, base of tegulæ, a transverse line on postscutellum, a transverse band broadly interrupted in middle on each of the four basal abdominal segments, a spot on each side of fifth segment, a transverse spot on each side of segments 2-5 beneath, a minute spot on each side near middle of the same segments and anterior femora beneath cream-yellow; posterior margin of pronotum and anterior legs dull ferruginous; intermediate and posterior tibiæ and tarsi fuscous. Wings fusco-hyaline, nervures black. Length 14 mm.

Hab.—Adelaide(?). Type in Oxford University Museum.

Most nearly allied to *T. aterrimus* Sm.

Subgenus Agriomyia Guér.

Agriomyia Guér., Voy. Coq. Zool. ii. 2, p.213, 1830(1839); Ashm., Canad. Ent. xxxv. 1903 (♂; nec ♀).

Cephalothynnus Ashm., Canad. Ent. xxxv. 1903.

♂. Labrum long and narrow, strongly bilobed at the apex; clypeus narrowly produced and truncate at the apex, maxillæ smooth, first joint of the maxillary palpi short. In nearly all the species there is an acute tubercle at the apex of the first ventral segment of the abdomen, and the hypopygium has an apical spine only. Antennæ rather short and of even thickness throughout. Second recurrent nervure received near the base of the third cubital cell.

♀. Head strongly flattened in most of the species; second abdominal segment marked with five transverse carinæ, fifth ventral segment punctured. In all the species, except *A. adelaidæ*, the tarsal ungues are bidentate. Pygidium lanceolate-ovate or more rarely lanceolate.

Type, *Agriomyia maculata* Guér.

85. T. (Agriomyia) maculatus Guér.

Agriomyia maculata Guér., Voy. Coq. Zool. ii. 2, p.218, 1830 [1839](♂); Guér., Mag. de Zool. xii. p.3, P.100, figs.1-4, 1842(♂); Sauss., Reise de Nov. Zool. ii. 1, Hym. p.116, n.1, 1867(♂).

Var. *Thynnus* (*Agriomyia*) *odyneroides* Westw., Arc. Ent. ii. 2, p.109, P.75, figs.3-4, 1844(♂♀).

Var. *Thynnus variegatus* Klug, Physik. Abh. Akad. Wiss. Berlin, p.20, n.12, P.1, fig.3, 1840[1842](♂).

In spite of the differences in colour and size I cannot find any sufficient ground for division in this common species. The male varies much in the yellow markings on the thorax; *T. odyneroides* Westw., which seems to be the commonest form in Victoria and the western country of New South Wales, is without yellow on the median segment; while the commonest form from Sydney northward is without the yellow mark on the scutellum, but has that on the median segment well developed. The typical form seems to be from S. Australia. *T. variegatus* Klug, seems to be close to the Sydney form.

I have seen very few females, but there does not seem to be much variation. In one specimen from Tasmania, where the prevalent male form is *T. odyneroides*, the pronotum is rather

narrower anteriorly than in the specimens I have seen from the mainland. The true limits of variable species such as the present one can only be ascertained when long series of both sexes are available, with full data as to locality and the pairs taken together.

Hab.—Adelaide, S.A., to Cairns, Q.

86. T. (Agriomyia) vividus Sm.

Thynnus vividus Sm , Descr. n.sp. Hym. p.161, n.11, 1879(♂).

This is very near *T. maculatus* var. *odyneroides*, but the clypeus is a little more produced, the scutellum is longer, and the abdomen is strongly punctured, the punctures not confluent.

Hab.—Swan River, W.A.(Smith).

87. T. (Agriomyia) jucundus Sm.

Thynnus (*Agriomyia*) *jucundus* Sm , Cat. Hym. B.M. vii. p.25, n.64, 1859(♂).

This is extremely near *T. maculatus*, but the whole insect is much more feebly sculptured. The yellow marks on the abdomen are larger and extend to the sixth segment. The known specimens are smaller.

Hab.—Australia, N. W. Coast.

88. T. (Agriomyia) medius Sm.

Thynnus medius Sm., Descr. n.sp. Hym. p.170, n.32, 1879(♂).

♂. Clypeus advanced and narrowly truncate at apex, closely punctured. Head and thorax very closely punctured; median segment finely rugulose. Abdomen fusiform, shallowly punctured, the punctures large; segments 2-5 faintly depressed on the apical margin, with a slightly raised curved mark on each side reaching almost to apex; a strongly impressed transverse line near base of segments 2-4. Hypopygium rounded, with an apical spine. Abdomen beneath strongly punctured; first segment with a strong tubercle at apex, deeply separated from second segment.

♀. Head broad anteriorly and rounded at sides, then sharply narrowed to posterior margin; flat, with a slightly convex area in centre; much broader than long; finely shagreened. Pronotum much narrower than head, longer than broad, sides nearly parallel. Mesonotum more than half as long as pronotum, a little longer than broad; the whole thorax sparsely punctured. Median segment rather slender, obliquely truncate posteriorly, more closely punctured than thorax. Abdomen sparsely punctured; first segment with a curved transverse carina, emarginate in middle, before apex, apical margin depressed; second segment with five transverse carinæ, including the recurved apical margin, carina before apex curved and obsolete in middle. Third and fourth segments with a strongly curved raised mark on each side before apical margin. Fifth segment above with a delicate longitudinal carina; beneath coarsely punctured. Pygidium oblong-ovate oblique, with a longitudinal carina and the lateral margins raised. Fusco-ferruginous; head fuscous, legs testaceous. Length 9 mm.

Hab.—S. Australia. In Oxford University Museum.

The male attached to this female differs from typical *T. medius* only in the colour of the clypeus, which is black with a yellow line on the anterior margin. Allied to *T. maculatus* Guér.

Var. BREWERI, n.var.

♂. Differs from typical *T. medius* in colour only. Clypeus black with a yellow line on apical margin, a short line on inner margin of eye, anterior margin of the pronotum narrowly interrupted, base of the tegulæ and the postscutellum yellow. The markings on the abdomen beneath as in typical *T. medius*, the band on segments 2-4 broadly interrupted on sides, leaving a small spot on each side near middle and close to apical margin. Length 13 mm.

♀. Similar to that of typical *T. medius* described above, but darker in colour.

Hab.—Albany, W.A. (Brewer). In Oxford University Museum.

89. T. (AGRIOMYIA) ROTUNDICEPS Sm.

Thynnus rotundiceps Sm., Cat. Hym. B.M. vii. p.46, n.133, 1859(♀).

?*Thynnus propinquus* Sm., Descr. n.sp. Hym. p.160, n.8, 1879(♂).

♂. Clypeus broad, advanced in middle and very narrowly truncate at apex, convex in centre, with a short longitudinal impressed line in middle; sparsely punctured, rather broadly truncate at base. Head finely and shallowly punctured, shining, interantennal prominence not much elevated and divided by a sulcus. Thorax opaque, finely and closely punctured on pronotum, punctured-rugose on mesonotum and scutellum; anterior margin of pronotum raised. Median segment finely punctured-rugulose, short and obliquely depressed from postscutellum. Abdomen fusiform, with a few small scattered punctures, the two apical segments strongly punctured; segments 2-4 with an impressed transverse line near base. First ventral segment with an acute tubercle at apex. Hypopygium rounded, with a short apical spine. Black; clypeus, inner margin of eyes as high as base of antennæ broadly, a large spot on each side above base of antennæ, anterior margin of pronotum, tegulæ, a narrow transverse band on each side of second, third and fourth abdominal segments and a small spot on each side of fifth near middle, a large spot on each side of second, third and fourth ventral segments and a small spot on each side of the same segments near middle yellow. Wings hyaline, nervures fuscous. Length 15 mm.

♀. Head very large, half as broad again as long, rounded at sides and posterior angles, very flat, a round slightly convex area on front; finely shagreened, a very short and faint longitudinal sulcus between antennæ. Thorax sparsely punctured, pronotum not more than half width of head, longer than broad, depressed at sides anteriorly, with prominent angles, broadly raised and prominent in middle of anterior margin. Mesonotum very narrow, longer than broad. Median segment more closely punctured, slender, very narrow at base, obliquely truncate posteriorly. First abdominal segment truncate anteriorly, finely

and closely punctured on upper edge of truncation, apical margin feebly raised with a depressed area before it, giving the appearance of a transverse carina before the depression. Second segment with five strong transverse carinæ, including the raised apical margin. The three following segments sparsely punctured, smooth at base and apex. Pygidium strongly compressed at base, ovate-lanceolate. Ventral segments, including the fifth, strongly punctured. Entirely dark brown. Length 10 mm.

Hab.—Australia (Smith); Cooktown and Mackay, Q.(Turner; ♂♀ in cop.); Adelaide, S.A.(*T. propinquus* Sm.).

The male is described from a Mackay specimen taken with a female exactly corresponding to the type, which is not likely to have come from North Queensland. It is with some hesitation that I sink the name *T. propinquus* Sm , the type of which differs much in colour, but not otherwise.

90. T. (Agriomyia) cingulatus, n.sp.

♂. Clypeus advanced, rather narrowly truncate anteriorly, punctured, with a faint median carina from base not reaching apex. Head large and broad, finely and very closely punctured, with a fine sulcus reaching from between antennæ halfway to anterior ocellus. Thorax very closely and finely punctured, scutellum rather more strongly punctured. Prothorax with a very narrow, shining, depressed transverse line just behind the slightly raised anterior margin, short and very broad. Scutellum large, prominent, raised above mesonotum and postscutellum, with a depressed, smooth transverse line at base, subtruncate at apex. Median segment depressed, obliquely truncate from close to base, closely and finely punctured, with white pubescence on sides. Abdomen short and broad, all the segments rather closely punctured, smooth at extreme apex, segments 2-5 with a depressed transverse line near base, the two apical segments more coarsely punctured. Basal segment beneath truncate vertically at apex and armed with a long acute tubercle. Hypopygium rounded, with the usual apical spine. Black; clypeus yellow, a short transverse mark in middle and a circular one below it brown, the

extreme apex black; two small spots at base of antennæ, a small one on each side on posterior margin of head, behind apex of eye, anterior margin of prothorax, tegulæ, a small mark on posterior margin of mesothorax, a spot on mesopleuræ beneath forewing, a short longitudinal line in middle of scutellum, a transverse line on postscutellum, a semicircular spot near base of median segment, and another very minute close to apex, a small spot on either side near apex; a transverse band emarginate posteriorly near apical margin on each side of abdominal segments 1-5 interrupted in centre, apex of tubercle beneath basal segment, a broad line, narrowly interrupted in centre near apical margin of segments 2-4 beneath, a spot on each side of segment 5 beneath and a spot at apex of coxæ pale creamy-yellow. Wings hyaline, nervures black. Length 14 mm.

Hab.—Swan River, W.A. Type in Oxford University Museum.

91. T. (Agriomyia) marginilabris Guér.

Agriomyia marginilabris Guér., Mag. de Zool. xii. p.3, P.100, figs.5-7, 1842(♂).

Agriomyia affinis Guér., *l.c.* p.4, 1842(♂).

Thynnus (*Agriomyia*) *consanguineus* Sm., Cat. Hym. B.M. vii. p.24, n.58, 1859(♂).

Thynnus (*Agriomyia*) *moestus* Sm., *l.c.* p.36, n.93, 1859(♂; nec♀).

♂. Guérin's figure of the head shows the strongly bilobed labrum characteristic of *Agriomyia*. I think the name *affinis* must sink as a synonym. The species may be distinguished from *T. luctuosus* Sm., by the ferruginous legs. There does not appear to be any other distinction, and I should have treated *T. luctuosus* as a mere variety if I had not seen the females of both forms.

♀. Head much broader than long, strongly narrowed posteriorly, the angles not rounded, compressed and slightly concave on sides, smooth and shining. Pronotum broader than long, finely and very sparsely punctured, anterior margin almost straight with prominent angles and a short median sulcus, strongly narrowed posteriorly with a well defined tubercle on each side

near angles. Abdomen sparsely punctured; first segment depressed at apex, carina before depression slightly emarginate in middle; second segment with five transverse carinæ, including the raised apical margin; pygidium elongate-ovate with a low median carina and the margins raised. Black; head, legs, second abdominal segment and pygidium bright ferruginous. Length 9 mm.

Hab.—Sydney, N. S.W.(Froggatt; ♂♀ in cop.).

The female differs from that of *T. luctuosus* Sm., in the shape of the head, in the smoother thorax, the tubercles on the pronotum and the broader pygidium. Further collecting is much needed to show the limits of the species in this group.

92. T. (Agriomyia) luctuosus Sm.

Thynnus (*Agriomyia*) *luctuosus* Sm., Cat. Hym. B.M. vii. p.26, n.68, 1859(♂).

Thynnus compressus Sm., *l.c.* p.43, n.118, 1859.

♂. Legs black. Smith's notice of varieties with ferruginous legs seems to apply to *T. marginilabris* Guér.

♀. Head large, much broader than long, strongly rounded at posterior angles, much flattened, shining and very finely shagreened, the front between antennæ deeply emarginate, clypeus with a median carina. Thorax and median segment shining and sparsely punctured, pronotum broader than long, much narrowed posteriorly, anterior margin straight, with prominent angles from which spring a few long hairs. Mesonotum longer than broad; median segment broadened from base, obliquely truncate posteriorly. Abdomen broader than median segment, the segments smooth at base and on the extreme apical margin, elsewhere sparsely but deeply punctured; first segment with a transverse carina near apex strongly emarginate in middle; second segment with four strong transverse carinæ, including the raised apical margin; third segment with a depressed transverse line in middle; third and fourth segments narrowly depressed on apical margin; fifth segment with a longitudinal carina on apical half. Pygidium oblique, ovate-lanceolate, the margins forming low

carinæ. Black; head, legs, second abdominal segment and apical margins of the other segments, pygidium and the whole insect beneath fusco-ferruginous. Length 12 mm.

Hab.—Cumberland, N. S.W.

93. T. (Agriomyia) rubellus Sm

Thynnus (*Agriomyia*) *rubellus* Sm., Cat. Hym. B.M. vii. 25, n.65, 1859(♂).

Except for the very different colour, I can see little to distinguish this from the common and very variable *A. marginilabris* Guér., but for the present it may be better not to sink the name. I have seen only the type.

Hab.—S. E. Australia.

94. T. (Agriomyia) molestus Sm.

Thynnus molestus Sm., Descr. n.sp. Hym. p.166, n.21, 1879(♂).

♂. Clypeus produced and narrowly truncate at apex, finely punctured at base, more strongly at apex. Head and thorax very closely punctured, the punctures sometimes confluent; interantennal carina only represented by a prominence above base of each antenna. Median segment rugulose, much broader than long. Abdomen closely and rather strongly punctured; first segment short, oblique anteriorly, with a stout blunt tubercle at apex beneath. Hypopygium rounded, with a short apical spine.

Hab.—S. Australia (Smith).

95. T. (Agriomyia) albomaculatus Sm.

Thynnus (*Agriomyia*) *albomaculatus* Sm., Cat. Hym. B.M. vii. p.27, n.69, 1859(♂).

Thynnus conspicuus Sm., Trans. Ent. Soc. London, 1868, p.233, n.4,(♂).

♂. Head rugulose, strongly rounded; clypeus narrowly produced and truncate at apex. Mesonotum and scutellum coarsely punctured; median segment short, rounded at sides, punctured-rugulose. Abdomen fusiform, shining, with a few small and

scattered punctures; first ventral segment with an acute tubercle at apex. Hypopygium rounded, with a short apical spine. The size is very variable, but the type is of about the average length.

Hab.—Adelaide, S.A.(Smith).

96. T. (Agriomyia) suspiciosus Sm.

Thynnus suspiciosus Sm., Descr. n.sp. Hym. p.161, n.10, 1879(♂).

♂. Clypeus minutely punctured, very narrowly truncate at apex. Head and thorax very finely and closely punctured; a delicate carina reaching from anterior ocellus to base of clypeus, interantennal prominence bilobed. Scutellum long, subtriangular, narrowly rounded at apex. Median segment obliquely truncate from postscutellum. Abdomen sparsely punctured; first segment with a tubercle at apex beneath. Hypopygium rounded, with a minute apical spine.

Hab.—Swan River, W.A.(Smith).

97. T. (Agriomyia) albopictus Sm.

Thynnus (*Agriomyia*) *albopictus* Sm., Cat. Hym. B.M. vii. p.26, n.67, 1859(♂).

♂. Clypeus convex, produced and narrowly truncate at apex, shining and very finely punctured. Head and thorax opaque and finely rugose; scutellum coarsely punctured, with a feeble longitudinal carina; median segment very short, abruptly but not quite vertically truncate posteriorly, finely punctured. Abdomen fusiform, shallowly punctured; first segment very short, and marked from base almost to apex with a sulcus; sixth segment strongly punctured. First ventral segment with a long tubercle at apex. Hypopygium rounded, with a short apical spine. Colour pale yellow, not white.

Hab.—Swan River, W.A.(Smith).

98. T. (Agriomyia) adelaidæ, n.sp.

♂. Clypeus produced and rather narrowly truncate at apex, closely punctured on sides, more sparsely at apex, the centre nearly smooth, a short carina from base continued by a faintly

depressed shining line to centre. Head very closely punctured, a faint longitudinal carina on front between antennæ. Pronotum rugulose, anterior margin raised; mesonotum and scutellum rugose, scutellum with a low carina from base to apex. Median segment rounded, delicately transversely rugulose. Abdomen fusiform, shallowly punctured; apical margin of the segments depressed and smooth; second segment strongly depressed at base; segments 3-5 with an impressed transverse line near base. First ventral segment with an acute tubercle at apex. Hypopygium rounded, with a short apical spine. Black; legs fuscous; anterior margins of face narrowly white. Wings hyaline, tinged with fuscous, nervures fuscous. Length 12 mm.

♀. Head shining, with a few scattered punctures, subquadrate, the sides behind eyes compressed and slightly narrowed, with a concave depression, another depression on front between eye and base of antenna, leaving the eye on a narrow ridge. Pronotum nearly twice as broad anteriorly as long and broadly emarginate, narrowed posteriorly. Abdominal segments delicately striated at base, very sparsely punctured at apex; second segment with four transverse carinæ, including the raised apical margin. Pygidium ovate-lanceolate, with a low longitudinal carina. Light ferruginous; the abdomen ferruginous-brown. Length 7 mm.

Hab.—S. Australia. Type in Brit. Mus.

99. T. (AGRIOMYIA) TROCHANTERINUS Westw.

Thynnus trochanterinus Westw., Arc. Ent. ii 2, p.116, P.77, fig.3, 1844(♂).

Thynnus trochantericus D.T., Cat. Hym. viii. 116, 1897(♂).

♂. Clypeus narrowly produced and truncate at apex, hypopygium rounded with a short apical spine as in typical *Agriomyia*. First ventral abdominal segment vertically truncate at apex and produced into a short blunt tubercle.

Hab.—Albany, W.A.; Victoria; New South Wales; Duaringa, Q.

The female of this common species is still unknown.

100. T. (Agriomyia) irregularis Smith.

Thynnus irregularis Sm., Descr.n.sp.Hym.p.162,n.13,1879(♂).

♂. Clypeus produced and very narrowly truncate at apex; head, pronotum and median segment finely and closely punctured; mesonotum more coarsely punctured; median segment short, depressed and rounded. Abdomen smooth, with a few scattered, minute and shallow punctures; fusiform, the basal segment not much narrowed; the two apical segments rugose. Hypopygium elongate-triangular. First ventral segment separated by a groove from second, shallowly truncate and subtuberculate at apex. Wings hyaline, faintly tinged with fuscous, nervures fusco-ferruginous.

Hab.—Swan River (Smith).

101. T. (Agriomyia) laevifrons Sm.

Thynnus lævifrons Sm., Cat.Hym.B.M.vii.p.45,n.130,1859(♀).

♀. Head flattened, shining, with a few small and scattered punctures, much broader anteriorly than long, strongly narrowed posteriorly. Thorax shining, very sparsely punctured; pronotum subrectangular, half as long again as broad, anterior margin with a few setigerous punctures and a deep sulcus extending to middle of segment; sides of prothorax slightly concave. Median segment finely and more closely punctured, obliquely truncate posteriorly, rounded at angles above truncation. First abdominal segment rather strongly punctured, the apical margin very slightly raised, with a broad transverse groove before it; second segment with five transverse carinæ, including the raised apical margin; the following segments rather closely punctured. Fifth ventral segment coarsely punctured. Pygidium ovate with a low longitudinal carina. Black; head piceous; antennæ, mandibles and legs fusco-ferruginous. Length 9 mm.

Hab.—S. E. Australia (Stutchbury).

102. T. (Agriomyia) incensus Sm.

Thynnus (*Agriomyia*) *incensus* Sm., Trans. Ent. Soc. London, p.236, n.10, 1868(♂).

♂. Clypeus produced and very narrowly truncate at apex, strongly punctured, with a carina from base to middle. Head and thorax punctured-rugose; median segment rounded, finely rugulose. Abdomen fusiform, transversely rugulose, the segments not constricted. Hypopygium very small, narrow at apex, and ending in a small spine.

Hab.—Champion Bay, W.A.(Du Boulay).

103. T. (Agriomyia) attenuatus Sm.

Thynnus attenuatus Sm., Cat.Hym. B.M. vii.p.42,n.114,1859(♀).

♀. Head very large, at least thrice as broad as pronotum, nearly twice as broad as long, moderately convex, rounded at sides. Pronotum very narrow; anterior portion depressed, forming a neck, anterior angles prominent, posterior portion much more elevated, a little produced over depressed portion, its anterior angles produced into rather long spines; the whole pronotum twice as long as broad, a little narrowed anteriorly. Median segment flat above, very narrow at base, strongly broadened and obliquely and shallowly truncate posteriorly, as broad at base of truncation as long. First abdominal segment not truncate, depressed and densely pubescent at base, apical margin broadly depressed, leaving a curved carina before apex; second segment with five transverse carinæ, including the raised apical margin; third and fourth segments with a raised curved mark on each side before apical margin, the raised space sparsely punctured. Pygidium lanceolate.

Hab.—Australia (Smith).

There are two specimens in bad condition in the British Museum. It is a very distinct species, and I place it in this genus with considerable doubt.

104. T. (Agriomyia) taeniolatus Froggatt.

Thynnus taeniolatus Frogg., Trans. Roy. Soc. S. Austr. xvi. p.71 1893(♂).

Hab.—Central Australia (Elder Expedition).

I have not seen this species, and cannot assign it to this genus with any certainty.

Subgenus Catocheilus Guér.

Catocheilus Guér., Mag. de Zool. xii. p.8, 1842.

♂. Sixth joint of maxillary palpi rudimentary; labrum narrowed posteriorly; abdomen somewhat flattened, the segments moderately constricted. Second recurrent nervure received near base of third cubital cell.

♀. Fifth ventral segment of abdomen longitudinally striated, pygidium broad and truncate.

Type, *Catocheilus klugii* Guér.

105. T. (Catocheilus) klugii Guér.

Catocheilus klugii Guér., Mag. de Zool. xii. p.8, P.102, figs.1-14, 1842(♂♀).

Thynnus diversus Sm., Cat. Hym. B.M. vii. p.41, n.110, 1859.

Thynnus perplexus Sm., Descr. n.sp. Hym. p.164,n.17,1879(♂♀).

This species is well figured by Guérin.

Hab.—Swan River.

Subgenus Lophocheilus Guér.

Lophocheilus Guér., Mag. de Zool. xii. p.11, 1842.

Myrmecodes Ashm., Canad. Ent. xxxv. 1903(*nec* Latr.).

Hemithynnus Ashm., *l.c.*

♂. Labrum narrowed posteriorly; abdomen not flattened, or if at all flattened the segments strongly constricted. Second recurrent nervure received at some distance from base of third cubital cell.

♀. Pygidium truncate posteriorly, not contracted on or before the truncation; fifth ventral segment rugose or striated.

Type *L. villosus* Guér.

I include in this subgenus several groups which will probably have to be separated later. The typical species has the first joint of the maxillary palpi shortened and the labium with a tuft of long recurved hairs at the apex. The female has the pygidium very narrow and the mandibles long and acute at the apex.

Most of the males I include in the subgenus have the mouth-parts similar, as far as I have been able to examine them; but *T. apterus* Oliv., has the palpi slender with subequal joints, the maxillæ and the labium smooth, and the labrum longer and less contracted; *T. purpureipennis* Westw., has the labrum shorter than *T. apterus* and truncate at the apex, and the palpi stouter; in *T. lubricus* and *T. vigilans* Sm., the labrum is short, broadly rounded at the apex in *T. lubricus*, smaller and more strongly rounded in *T. vigilans*, the first joint of the maxillary palpi is also shortened.

The usual form of the pygidium in the female is broad with almost parallel sides, vertically truncated and longitudinally striated; the mandibles in the larger species are blunt.

Ashmead places *Lophocheilus* Guér., amongst his Rhagigasterinæ, but states that he has not seen specimens. His guess that it may be the opposite sex of *Eirone* Westw., is wild.

106. T. (Lophocheilus) villosus Guér.

Lophocheilus villosus Guér., Mag. de Zool. xii. 12, P. 103, figs. 7-13, 1842(♂).

Thynnus niger Sm., Cat. Hym. B.M. vii. p. 30, n. 76, 1859(♂).

♂. Clypeus short, rather narrowly produced and truncate at apex, closely punctured and without a carina. Head and thorax very closely and finely punctured; scutellum subtriangular, almost pointed at apex. Median segment very closely and minutely punctured, rounded and narrowed to apex. Abdomen fusiform, closely and shallowly punctured, the segments slightly constricted near base. Hypopygium prominent at apical angles, thence rather broadly rounded, subtruncate at apex, with an apical spine. Length 14-17 mm.

♀. Head shining, very sparsely punctured, slightly convex, much broader than long, narrowed and rounded posteriorly; eyes oval and almost touching base of mandibles; a very short longitudinal sulcus between antennæ. Thorax and median segment very finely and closely punctured; pronotum rectangular, about twice as broad as long; median segment oblique from mesonotum. Abdomen much broader than thorax, the segments smooth at base, sparsely punctured at apex; first segment with the apical margin raised and a broad groove before it; second segment with about seven transverse carinæ, including the raised apical margin which is rather broadly separated from the other carinæ, the carinæ in the middle broken and irregular. Fifth ventral segment coarsely rugose. Pygidium lanceolate, sides nearly parallel. Black; legs and pygidium ferruginous; antennæ and mandibles fuscous. Length 10 mm.

Hab.—Tasmania, Huon River (Lea). Type of ♀ in Brit. Mus.

Some specimens of the male have indications of a carina on the clypeus.

Guérin's description is very poor, but I think I am right in identifying his *L. villosus* with *T. niger* Sm., from the type of which my description is taken. It is a common Tasmanian species, but does not seem to occur on the mainland.

107. T. (Lophocheilus) fervens Sm.

Thynnus (*Agriomyia*) *fervens* Sm., Cat. Hym. B.M. vii. p.31, n.79, 1859(♂).

♂. Clypeus short, rather narrowly produced and truncate at apex, with a strong carina from base to apex and closely punctured. Abdomen fusiform; hypopygium very short and broad, slightly prominent at basal angles, thence rounded to apex, with a minute apical spine.

Hab.—Australia (Smith).

108. T. (Lophocheilus) anilitatis Sm.

Thynnus (*Agriomyia*) *anilitatis* Sm., Cat. Hym. B.M. vii. p.37, n.98, 1859(♂♀).

The type is apparently lost. As far as I can judge from Smith's very incomplete description the name should apply to a species very near *T. fervens* Sm., from which it differs in the hypopygium, which is broad at the base, with a rounded prominence on each side near the angles, thence broadly produced and subtruncate at the apex, with an apical spine. The legs are black, not ferruginous as in *T. fervens*, and the calcaria of the tibiæ whitish.

♀. Head much broader than long, narrowed and rounded posteriorly, sparsely punctured. Pronotum about twice as broad as long, very closely and finely punctured; median segment short and minutely punctured. Abdomen punctured-rugulose, segments smooth at base; first segment with a transverse carina before apex, and the apical margin raised; second segment with six transverse carinæ, the basal and two apical carinæ strongly raised, the three others irregular and lower. Pygidium narrow, longitudinally striated at base, sides almost parallel, hypopygium broadened at apex. Fifth ventral segment longitudinally rugose. Black; mandibles except at apex, apex of the two basal abdominal segments and of pygidium, and tibiæ beneath obscure fusco-ferruginous. Length 10 mm.

Hab.—Melbourne (French).

109. T. (Lophocheilus) mamillatus, n.sp.

♂. Clypeus broad, narrowly produced and truncate at apex, with a strong median carina from base reaching nearly to apex, apical margin a little raised. Interantennal prominence strongly bilobed, front rugulose, vertex punctured-rugulose. Head broader than prothorax, clothed with long thin pubescence, white on sides and on clypeus, elsewhere cinereous. Thorax and median segment finely punctured-rugulose, anterior margin of pronotum slightly raised, sculpture strongest on scutellum and on disc of mesonotum. Median segment short, depressed and rounded.

Abdomen fusiform, not very much narrowed at base, first segment with a median carina beneath and a deep groove between first and second segments. Segments 2-4 with a delicate transverse carina near base, followed by a deep transverse line; second segment beneath with a prominent tubercle at base. All the segments finely and closely punctured. Hypopygium broad, with a subtriangular projection on each side near basal angles, thence triangularly produced to apical spine. Black; the two apical abdominal segments ferruginous-red. Wings hyaline, nervures black. Length 15 mm.

Hab.—Fremantle, W.A.

Type in Brit. Mus.(collected by Commander Walker).

110. T. (Lophocheilus) ambiguus, n.sp.

♂. Clypeus strongly convex, broadly truncate anteriorly, deeply punctured, with a carina from base to apex. Head finely and closely punctured, with a faint carina from anterior ocellus to base of clypeus. Antennæ as long as thorax and median segment combined. Thorax finely and closely punctured; median segment very delicately rugulose. Abdomen slender at base, shining, finely and shallowly punctured; segments 2-5 with an impressed transverse line near base and a faint, raised, curved mark on sides near apical margin; the apical segment rugose, with a few rounded striations at apex. Hypopygium elongate-triangular, with a very short curved apical spine. Black; tibiæ beneath light ferruginous Wings hyaline, tinted with yellow, nervures black. Length 13 mm.

♀. Head convex, about half as broad again as long, rounded at posterior angles. The whole insect sparsely punctured. Pronotum rather narrower than head, rectangular, much broader than long. First abdominal segment truncate anteriorly, apical margin raised, with a groove before it giving the appearance of a transverse carina before apex. Second segment with five transverse carinæ of about even elevation, including the recurved apical margin. All the segments smooth at base. Pygidium narrow, almost vertically truncate posteriorly, longitudinally

striated, sides nearly parallel. Fifth segment beneath longitudinally striated. Black; legs testaceous-brown. Length 9 mm.

Hab.—Australia (Macleay). Type in Oxford University Museum.

Very near *T. fervens* Sm., but the hypopygium is quite different.

111. T. (Lophocheilus) tenuatus Sm.

Thynnus (*Agriomyia*) *tenuatus* Sm., Cat. Hym. B.M. vii. p.31, n.80, 1859(♂).

Allied to *T. vigilans* Sm. Hypopygium broad, gradually narrowed, and truncate at apex, without any prominence at basal angles and without an apical spine. Maxillary palpi very slender. In some specimens the legs are fusco-ferruginous.

Hab.—Fremantle, W.A.(J. J. Walker).

112. T. (Lophocheilus) vigilans Sm.

Thynnus (*Agriomyia*) *vigilans* Sm., Cat. Hym. B.M. vii. p.28, n.70, 1859(♂).

♂. Clypeus broadly truncate anteriorly, strongly punctured, pointed at base. Head rather small, rugulose, with thin fulvous pubescence. Thorax delicately punctured, pronotum narrower than head, the anterior margin raised, with a depressed, shining, transverse line behind it. Median segment rounded, rather long and slender, finely rugulose. Abdomen elongate, closely and shallowly punctured, epipygium rugose. Hypopygium rather short, bluntly produced near basal angles, thence triangular to base of the slightly recurved apical spine. Second recurrent nervure received by the third cubital cell on middle of lower margin. Colour as in Smith's description, but varying considerably.

♀. Head a little broader than long, very strongly rounded at posterior angles, smooth and shining, sparsely punctured on front. Pronotum a little broader than long, the sides parallel, finely punctured. First abdominal segment coarsely punctured, the apical margin slightly raised, with a groove before it, giving the

appearance of a second transverse carina before apex. Second segment with six transverse carinæ, including the recurved apical margin; the following segments smooth at base, finely punctured at apex. Pygidium narrow, of about even width throughout, obliquely truncate posteriorly, surface of the truncation longitudinally striated. Fifth ventral segment coarsely rugose on apical half with a deep central emargination. Black; second abdominal segment fuscous; head and legs, except coxæ and trochanters, ferruginous. Length 8 mm.

Hab.—Melbourne, Vic. In Oxford University Museum.

Var. INCERTUS, n.var.

♂. Shape and sculpture as in typical *T. vigilans*. Black; mandibles, except at apex, clypeus at apical angles and on sides near base, margin of face, margins of eyes to above base of antennæ, a spot near eye on each side of vertex, a transverse line on postscutellum, a large, transverse mark on each side of the five basal abdominal segments, and a smaller spot on each side of the sixth yellow. Length 18 mm.

Hab.—Australia (Higgins). Type in Oxford University Museum.

Differs from *T. vigilans* in the much larger extent of the yellow markings on the abdomen, and in the larger size. It seems to be fairly constant, as more than one specimen from the same source shows a similar extension of the coloured areas.

113. T. (LOPHOCHEILUS) COGNATUS Sm.

Thynnus cognatus Sm., Cat. Hym. B.M. vii. p 28, n.71, 1859(♂).

♂. Clypeus long, convex, and rather broadly truncate at apex. Head small. Median segment very finely and closely punctured. Abdomen elongate, subpetiolate, shining, with a few scattered punctures; first segment very long. Hypopygium with a rounded prominence on each side at basal angles, thence elongate-triangular, with an acute apical spine. Otherwise as in Smith's description.

Hab.—S. E. Australia.

From a collection made between Sydney and Brisbane, and in S. Australia (Stutchbury).

114. T. (Lophocheilus) lubricus, n.sp.

♂. Clypeus strongly convex, coarsely and sparsely punctured, pubescent, the anterior margin slightly depressed, broadly truncate. Front strongly punctured, pubescent, antennæ rather far apart at base, anterior margin of the prominence between them straight, overhanging base of clypeus. Occiput smooth and shining. Pronotum rather narrower than head, nearly smooth, slightly depressed anteriorly, the margin not much raised. Mesonotum finely and closely punctured on sides, more sparsely on disc. Scutellum strongly but shallowly punctured. Median segment rounded, shining, with very minute punctures. Abdomen elongate-fusiform, very shallowly punctured, segments 2-6 with a fine transverse carina near base. Epipygium rounded at apex, with about seven longitudinal carinæ. Hypopygium prominent, broad at base, subtriangular, with a short apical spine. The groove between first and second abdominal segments beneath not very strongly marked. Entirely black, with cinereous pubescence. Wings fusco-hyaline with bronze reflections, nervures black. Length 15-18 mm.

♀. Head nearly twice as broad as long, strongly convex, rounded at posterior angles, sparsely punctured, very shallowly and finely on occiput, more coarsely on front, with a very fine and short longitudinal sulcus on front. Mandibles rather long and pointed. Thorax very finely punctured, pronotum much broader than long; median segment short, sparsely punctured, obliquely truncate posteriorly. First abdominal segment truncate at base, with a transverse carina emarginate in middle just before apex, obliquely striate. Second segment with five well marked transverse carinæ, including the recurved apical margin; another less distinct just before apex. Third and fourth segments punctured near base, smooth and shining at apex, the apical margin slightly depressed, leaving a raised curved mark on each side close to apical margin. Fifth segment smooth at base, coarsely punctured at apex. Pygidium deflexed and subtruncate, more than twice as long as the greatest breadth, gradually widened from base to apex where it is rounded; the surface

longitudinally striated. Black; mandibles, antennæ, legs and apical margin of second abdominal segment and of pygidium piceous. Length 8-9 mm.

Hab.—Cairns, Q.(Turner; ♂♀ in cop.).

115. T. (LOPHOCHEILUS) PURPUREIPENNIS Westw.

Thynnus purpureipennis Westw., Arc. Ent. ii. 2, p.143, P.83, fig.10, 1844(♂).

Thynnus maurus Sm., Cat. Hym. B.M. vii. p.37, n.96, 1859(♂).

♂. Clypeus convex in middle, advanced and rather narrowly truncate at apex, rugulose. Head finely punctured, very sparsely on vertex, with a longitudinal frontal sulcus from anterior ocellus. Abdomen elongate, first ventral segment with a broad, triangular truncation at apex; sixth ventral segment with a spine on each side at apical angles. Hypopygium with basal angles prominent; triangular, with a short apical spine. Wings dark fuscous, flushed with purple.

♀. Head nearly twice as broad as long, strongly rounded posteriorly, shining, smooth on vertex, finely punctured on front, position of ocelli marked by deep punctures. Pronotum finely and sparsely punctured, narrower than head, slightly narrowed posteriorly, about half as broad again as long; the anterior margin almost straight, with a few large punctures. Median segment short, obliquely truncate posteriorly, finely rugulose. Abdomen shining, segments smooth at base, sparsely punctured at apex; first segment vertically truncate anteriorly, rugose, the apical margin raised, with a transverse groove before it. Second segment with nine transverse carinæ, including the recurved apical margin, those at base a little lower and often concealed by the first segment. Fifth ventral segment coarsely rugose on apical portion. Pygidium fairly broad, truncate posteriorly and longitudinally striated, sides almost parallel; hypopygium slightly broadened at apex by membranous processes. Black; mandibles and antennæ fuscous-ferruginous. Length 15 mm.

Hab.—Sydney (Froggatt; ♂♀ in cop.).

116. T. (LOPHOCHEILUS) EXCORIATUS, n.sp.

♂. Clypeus convex at base, broadly truncate anteriorly and strongly punctured. Head and thorax very closely punctured, with long cinereous pubescence; sides of head with a fringe of long hairs, recalling the genus *Tachynomyia*; scutellum large, broadly truncate at apex. Median segment finely punctured-rugulose. Abdomen elongate-fusiform, sparsely and shallowly punctured; first segment with a sulcus from base nearly reaching apex; segments 2-5 with an impressed transverse line near base; segments 3-4 beneath with a blunt tubercle on each side; epipygium rounded at apex, with a few curved striations. Hypopygium with a longitudinal carina beneath, delicately transversely striated above, broad at base, basal angles slightly prominent, broadly subtriangular, rounded at apex and with a strong spine. Black; mandibles, clypeus, interior margin of eyes as high as base of antennæ, a small spot above base of each antenna, exterior margin of eyes connected by a broad line on vertex, pronotum obscurely, tegulæ, mesopleuræ, abdomen and legs ferruginous; base of first abdominal segment and a broad longitudinal band on apical portion of first and on second segment, narrowly continued on third black. Wings hyaline tinged with yellow, nervures fusco-ferruginous. Length 15 mm.

♀. Clypeus a little advanced, broadly rounded at apex, with a carina from base. Head moderately convex, half as broad again as long, strongly rounded posteriorly and sparsely punctured. Thorax and median segment very finely punctured; pronotum narrower than head, rectangular, half as broad again as long, with a few setigerous punctures along anterior margin; mesonotum not very narrow; median segment short, obliquely truncate posteriorly. Abdomen almost smooth; first segment vertically truncate anteriorly, the apical margin depressed, leaving a transverse carina before apex; second segment with about fifteen low transverse carinæ, including the raised apical margin, the carinæ at apex a little stronger than those at base. Pygidium not contracted, vertically truncate posteriorly and

longitudinally striated, much longer than broad and slightly narrowed to apex. Ferruginous; abdomen black; a spot on each side of first segment near middle, a spot on each side of second, an interrupted transverse band on third and fourth and a spot on each side of fifth segment yellow; second segment stained with ferruginous. Length 10 mm.

Hab.—Australia, probably the South-Eastern Colonies. Types in Coll. Froggatt.

Near "*Tachynomyia*" *caelebs* Sauss.

The colour of the clypeus and of the markings on the front of the head in the male would probably be yellow in a fresh specimen.

117. T. (Lophocheilus) wieseri D.T.

Tachynomyia caelebs Sauss., Reise d. Nov. Zool. ii. 1, Hym. p.125, n.1, 1867(♂).

Thynnus wieseri D.T., Cat. Hym. viii. 118, 1897(♂).

I have not seen this species, which seems to be very near *T. excoriatus*, but differs in having a tubercle or spine on the fifth ventral segment of the abdomen. Length 10 mm.

Hab.—Australia(Sauss.).

118. T. (Lophocheilus) petulans Sm.

Thynnus petulans Sm., Descr. n.sp. Hym. p.165, n.18, 1879(♂).

♂. Median segment finely rugulose; abdomen shining, sparsely punctured, elongate-fusiform; epipygium deflexed, truncate at apex, longitudinally striated, the striæ curved and rounded to apex. Hypopygium triangular, with a short apical spine, transversely striated above.

Hab.—Swan River, W.A.(Smith).

119. T. (Lophocheilus) protervus Sm.

Thynnus protervus Sm., Descr. n.sp. Hym. p.159, n.4, 1879(♂).

♂. Clypeus strongly produced, rather broadly truncate at apex, convex, coarsely punctured Head finely and closely punctured; interantennal carina transverse, a delicate carina on front from

anterior ocellus to between the antennæ. Antennæ about as long as abdomen. Thorax finely and closely punctured, anterior margin of pronotum straight and strongly raised; scutellum with a depressed, transverse row of punctures at base. Median segment rugulose. Abdomen elongate-fusiform, shining, with a faintly impressed transverse line near base of segments 2-6. Epipygium with curved striæ at apex; hypopygium elongate-triangular, with a short apical spine, basal angles prominent. The legs in some specimens are almost entirely black and the wings tinged with yellow.

♀. Head half as broad again as long, convex, rounded at posterior angles, shining and sparsely punctured, with a longitudinal sulcus between antennæ. Thorax and median segment very finely and rather closely punctured, pronotum almost rectangular, much broader than long, the anterior margin straight, with a few large setigerous punctures. Mesonotum small; median segment obliquely truncate from mesonotum. Abdomen shining, very sparsely punctured, third segment broadest; first segment rather long and narrow at base, the apical margin raised and three or four irregular transverse striæ before it; second segment with about twelve transverse carinæ, including the raised apical margin, those near apex the strongest and most regular. Pygidium almost vertically truncate, fairly broad, sides almost parallel, incised near apex leaving a spine on each side continuous with lateral margin; surface of truncation longitudinally striated. Fifth ventral segment coarsely longitudinally rugose. Black; head and second abdominal segment fusco-ferruginous; antennæ, mandibles and legs ferruginous; a transverse band on first abdominal segment near base, a spot on each side of second, a narrowly interrupted transverse band on middle of third and fourth, and two spots on each side of fifth segment yellow. Length 11 mm.

Hab.—Adelaide(Smith). Types (♂♀) in Brit. Mus.

The female has not been previously described. A coupled pair is in the Oxford Museum.

120. T. (Lophocheilus) flavifrons Sm.

Rhagigaster flavifrons Sm., Trans. Ent. Soc. London (3) ii. 5, p.390, 1865(♀).

♀. Head sparsely and deeply punctured on front, more finely and closely on vertex, with a deep longitudinal sulcus on front, half as broad again anteriorly as long, a little narrowed posteriorly, very slightly convex; eyes situated at some distance from base of mandibles; clypeus transverse, with a carina from base to apex. Thorax and median segment sparsely and deeply punctured, minutely and closely punctured between the larger punctures; pronotum nearly as broad as head, much broader than long, subrectangular; median segment broadened and oblique posteriorly, but not strongly truncate. Abdomen very delicately punctured, with a few large and scattered punctures; first segment narrow and truncate at base, widened to apex; second segment wider at apex than at base, transversely rugose at base, with low, irregular, transverse carinæ at apex, the apical margin raised; a small tuft of fulvous hairs close to apical angles of fifth segment. Pygidium rather small, vertically truncate, rarely twice as long as broad, sides almost parallel, produced into a short spine on each side just before rounded apex, longitudinally striated, almost smooth at apex. Black; base of mandibles and front of head yellow; thorax and median segment ferruginous; tarsi ferruginous-brown; pygidium fusco-ferruginous. Length 13 mm.

Hab.—Swan River, W.A.(Du Boulay).

I do not understand why Smith referred this species to *Rhagigaster*.

121. T. (Lophocheilus) obscurus Klug.

Thynnus obscurus Klug, Physik. Abh. Akad. Berlin, p.22, n.4, P.1, fig.4, 1840[1842](♂).

Thynnus (*Thynnoides*) *obscurus* Westw., Arc. Ent. ii. 2, p.138, P.82, fig.2, 1844(♀).

♂. There is a good deal of variation in the development of the carina on the clypeus. I have seen a specimen in Mr. Froggatt's

Collection from Mulwala, N. S.W., in which the clypeus is wholly yellow, and with the carina only visible on the extreme base.

♀. I have examined several females which I believe to be correctly assigned to this species, and find much variation in the number of carinæ on the second abdominal segment. The carinæ are slightly broken and irregular, but vary in number from seven to about twelve. As the specimen with only seven carinæ has also a spine on each side of the pygidium slightly developed, it may prove to be distinct; but in other specimens the number of carinæ is intermediate. In reference to this variation I may refer to my remarks on *T. apterus* Oliv.

Hab.—Victoria; Woodford, Blue Mts.(Waterhouse), Mulwala, N. S.W.(Froggatt).

122. T. (Lophocheilus) laeviceps Sm.

Thynnus laeviceps Sm., Cat. Hym. B.M.vii.p.44,n.124,1859(♀).

♀. Extremely near *T. obscurus* Klug, but the head is a little smaller and flatter, and the raised apical margin of the second abdominal segment is separated more widely from the transverse carinæ before it.

Hab.—Australia (Smith). Said to come from the North or N.W. Coast.

123. T. (Lophocheilus) froggatti, n.sp.

♂. Clypeus advanced and rather narrowly truncate anteriorly, punctured and clothed with long cinereous pubescence, with a strong carina from base to apex. Head very finely and closely punctured, interantennal prominence very broad and bilobed; an almost obsolete, interrupted carina from below the anterior ocellus, not reaching base of clypeus. Thorax very finely and closely punctured; median segment delicately rugulose, rounded and depressed. Abdomen fusiform, very finely punctured, segments almost smooth at their base; first segment oblique anteriorly, with a longitudinal sulcus from base not reaching apex; beneath the segment is obliquely truncate at apex, leaving a deep space between first and second segments. Segments 2-5 above with a

strongly depressed transverse line near base. Epipygium rugose at apex; abdomen beneath rugulose. Hypopygium with a stout spine on each side near basal angles, thence sharply narrowed and produced with parallel sides, narrowly rounded at the base of the strong apical spine. Anterior coxæ strongly hollowed. Black; the pubescence thin and cinereous. Anterior margin of clypeus, mandibles except at apex, and a minute spot on each side above base of antennæ yellow. Legs, except coxæ, and tegulæ ferruginous. Wings flavo-hyaline, nervures fuscous. Length 22 mm.

♀. Clypeus with a carina from base. Head much broader than pronotum, only slightly convex, strongly rounded posteriorly, shining, almost smooth on vertex, finely punctured on front, with a short longitudinal sulcus between antennæ. Pronotum much broader than long, closely and finely punctured, not much narrowed posteriorly, anterior margin slightly arched, with a few large punctures from which spring long hairs. Mesonotum finely punctured, broadly rounded posteriorly. Median segment short, narrower than pronotum, obliquely truncate posteriorly, coarsely and sparsely punctured, surface of truncation shagreened. Abdominal segments sparsely punctured, smooth at base; first segment with apical margin raised and a groove before it, giving the appearance of a transverse carina before apex; second segment with seven or eight transverse carinæ, including the recurved apical margin, carinæ near base more or less irregular; apical half of fifth ventral segment longitudinally rugose. Pygidium longitudinally striated, oblique, not very narrow, sides parallel, epipygium narrowly rounded at apex, suddenly narrowed just before apex, leaving sharp angles. Black; legs and mandibles, except at apex, ferruginous; antennæ fusco-ferruginous.

Hab.—Leura, N. S.W.(Froggatt; ♂♀ in cop.); Woodford, Blue Mts.(Waterhouse; ♂). Types in Coll. Froggatt.

124. T. (Lophocheilus) kirbyi, n.sp.

♂. Clypeus tumid in the centre, produced and rather narrowly truncate at apex; the whole head closely and finely punctured,

prominence between antennæ deeply emarginate, pubescence on head long, whitish on front and sides, thinner and cinereous on vertex. Thorax finely and closely punctured, with thin cinereous pubescence; pronotum as broad as head; median segment short, depressed and oblique, with long, thin whitish pubescence. Abdomen fusiform, shining, finely punctured; a deeply impressed transverse line near base of segments 2-5; apical segment rugose, with three semicircular striæ at apex. Abdomen beneath strongly punctured, a fringe of short whitish pubescence on apical margin of the segments. Hypopygium carinate and punctured beneath, transversely striate above; a blunt projection on each side near base, thence produced in an elongate, triangular form, ending in a long, slender, faintly recurved spine. Opaque black; abdomen shining; mandibles, except at apex, and anterior margin of clypeus yellow. Tibiæ and tarsi fuscous. Wings pale fusco-hyaline, nervures black. Length 24 mm.

♀. Head convex, rounded, mandibles very blunt; clypeus transverse, with a median carina. The whole head sparsely punctured, with a short, median, longitudinal sulcus on front. Pronotum a little narrower than head, broader than long, very finely reticulate. Mesothorax and median segment sparsely punctured; median segment short, obliquely truncate posteriorly. First abdominal segment vertically truncate at base, with a longitudinal, median sulcus on surface of truncation, apical margin raised, with three or four fine transverse carinæ just before apex. Second segment with about twelve more or less irregular transverse carinæ, those near apex rather stronger than those at base. Third, fourth and fifth segments smooth at base, sparsely punctured at apex. Pygidium about twice as long as broad, vertical, sides nearly parallel, broadly rounded at apex, with a strong spine on each side near apex forming a continuation of lateral margins. Black; front and posterior margin of head, a broad band on first abdominal segment above the truncation, almost touching apical margin at sides, sides of second segment, apical half of three following segments and extreme base of pygidium yellow; clypeus, mandibles, antennæ, a broad band on vertex

interrupted by a broad black V-shaped mark, a curved line on each side of abdominal segments 3-5 near apical margin and legs ferruginous-brown. Length 16 mm.

Hab.—Cumberland County, N. S.W.

125. T. (Lophocheilus) tuberculiventris Westw.

Thynnus tuberculiventris Westw., Arc. Ent. ii. 2, p.118, P.76, fig.2, 1844(♂).

This species may be distinguished from *T. crinitus* by the less strongly fusiform abdomen, which is also closely and shallowly punctured instead of smooth and shining; and by the presence of a small tubercle on each side of the second ventral segment close to the apical margin. Length 20 mm.

I have received a female with this species which can only be distinguished from that of *T. rufiventris* by the shape of the pygidium, the sides of which are not parallel but convergent towards the rounded apex. But it is possible that the pairing is inaccurate in this case.

Hab.—Albany, W.A.; Victoria(French).

126. T. (Lophocheilus) crinitus, n.sp.

♂. Clypeus moderately produced and rather broadly truncate at apex, only slightly convex. Head, thorax and median segment finely rugulose, clothed with fulvous pubescence on head and disc of thorax, with grey pubescence on median segment and on thorax beneath. Pronotum as broad as head, broadly emarginate anteriorly, with prominent angles. Median segment rounded, depressed from postscutellum. Abdomen fusiform, shining, with a slightly impressed transverse line near base of segments 2-5. Epipygium strongly punctured at base, with a few curved striæ at apex. Hypopygium with a rounded prominence on each side at basal angle, thence triangular to base of the acute and slightly recurved apical spine. Black; mandibles except at apex, anterior margin and sides of clypeus, a large spot on each side of all the dorsal segments of abdomen and of all except basal ventral segments orange; legs, except coxæ, ferruginous. Length 29 mm.

♀. Clypeus with a strong carina from base to apex. Head large, broader than long, strongly rounded, sparsely punctured, with a longitudinal sulcus between antennæ, eyes elongate-oval, not touching base of mandibles. Pronotum rather narrower than head, twice as broad as long, anterior margin slightly arched. Thorax and median segment sparsely punctured. Abdomen shining, sparsely and shallowly punctured, first segment vertically truncate anteriorly, surface of truncation slightly concave, apical margin raised, with several transverse striæ before it. Second segment with about twelve more or less irregular transverse carinæ; fifth ventral segment rugose at base, longitudinally striated at apex. Pygidium vertically truncate posteriorly and longitudinally striated, moderately broad, the sides parallel and produced into stout spines near apex of epipygium, hypopygium rounded at apex. Black; mandibles except at apex, antennæ, vertex, disc of pronotum and legs except coxæ ferruginous; front of head, mesonotum, sides of pronotum and of median segment, a broad band on first abdominal segment above truncation, and a very broadly interrupted band on the four following segments above and beneath orange-yellow. Length 21 mm.

Hab.—Melbourne(French; ♂♀ in cop.).

This is the Victorian form of *T. rufiventris* Guérin. In addition to the difference in colour the male may be distinguished by the shorter clypeus; and the female by the more elevated and less numerous carinæ on the second abdominal segment.

A male specimen sent by Mr. French was bred from a cocoon similar to that from which I have bred *Salius australasiæ* Sm., one of the largest of our Pompilidæ.

127. T. (Lophocheilus) rufiventris Guér.

Thynnus rufiventris Guér., Voy.Coq.Zool. ii. 2, p.227, 1830 [1839](♂); Sm., Cat. Hym. B.M. p.13, n.7, 1859(♀).

♂. Abdomen elongate-fusiform, shining, with a slightly impressed transverse line near base of segments 2-6, apical margin of the same segments depressed at sides. Hypopygium with a prominent tubercle on each side at basal angles, thence triangular

to base of apical spine. The whole abdomen ferruginous-orange, with a large spot of a lighter colour on sides of each abdominal segment.

♀. Clypeus with a carina at base, produced and almost pointed at apex. Mandibles very broad, blunt at apex. Head large, more than half as broad again as long, rounded at posterior angles, moderately convex, with a short longitudinal sulcus between antennæ. Pronotum about two-thirds of width of head, anterior margin arched, with a few large punctures along it, the sides parallel. When the head is depressed the prothorax is seen to be produced anteriorly into a depressed and narrowed neck; this is black and seems to be referred to by Smith as the prothorax, the pronotum and mesonotum being mentioned as the mesothorax and scutellum. Mesonotum transverse and very short, rather more than half as wide as pronotum, median segment short, obliquely truncate posteriorly. Abdomen much broader than thorax, first segment with a few indistinct transverse striæ and a broad groove just before apical margin; second segment transversely striated, with a broad groove before apex. Pygidium broad, vertically truncate, sides parallel, longitudinally striated. Length 21 mm.

Hab.—Sydney (Guérin); Goulburn, N. S.W.(Froggatt; ♂♀ in cop.).

128. T. (Lophocheilus) wallisii Sm.

Thynnus wallisii Sm., Cat. Hym. B.M. vii. p. 14, n. 10, 1859(♂♀).

This species is allied to *T. rufiventris* Guér. Smith's description of the male is fuller than usual, but the apical spine of the hypopygium is acute and slightly recurved, not blunt.

♀. Head sparsely punctured, shining, slightly convex, about half as broad again as long, rounded at posterior angles; mandibles broad, and blunt at apex; clypeus narrowly produced, with a delicate carina from base to apex. Thorax sparsely punctured; pronotum much broader than long, nearly as broad as head, anterior margin slightly arched, with a row of large setigerous punctures. First abdominal segment with several low transverse

carinæ before apex; second segment with about twenty low transverse carinæ. Fifth ventral segment longitudinally striated. Pygidium vertically truncate posteriorly and longitudinally striated, sides of epipygium parallel, produced into short blunt spines a little before apex, which is pointed; hypopygium broad, narrowly emarginate at apex.

Hab.—Sydney(Smith); Melbourne(French).

129. T. (Lophocheilus) australis Boisd.

Thynnus australis Boisd., Voy. Astrolabe, Zool. ii. 6, p. 655, P. 12, fig. 2, 1833(♂).

I cannot identify this species from the very poor description, and the figure is utterly useless. I cannot, however, see any cause for supposing it to be identical with *T. annulatus* Kirby, of which it has been regarded as a synonym by many authors, who have followed a vague suggestion of Guérin, who is careful to state that he had not seen either species.

This may prove to be a form of *T. rufiventris* Guér. The length of the figure is 23 mm.

Hab.—Port Western(Boisd.).

130. T. (Lophocheilus) immodestus, n.sp.

♂. Clypeus strongly produced and rather broadly truncate at apex, convex and strongly punctured; a short tubercle at base of each antenna. Head and thorax very closely punctured, with thin pubescence, longest on sides of head; scutellum long, broadly truncate at apex. Median segment finely rugulose. Abdomen elongate, narrowed at base, smooth and shining, with a few scattered punctures. Hypopygium bluntly produced at sides near base, thence triangular to base of short apical spine. Black; clypeus and mandibles yellow; pronotum, tegulæ, a quadrate spot on mesonotum, scutellum, abdomen beneath and legs dull ferruginous; a spot on each side of all the abdominal segments and the whole of the seventh segment ferruginous-orange. Wings flavo-hyaline. Length 20 mm.

♀. Head much broader than long, slightly rounded at posterior angles, sparsely and deeply punctured. Thorax very sparsely punctured; pronotum rectangular, much broader than long, with a row of large setigerous punctures on anterior margin. Median segment short, obliquely truncate posteriorly, minutely and very closely punctured. Abdomen shining, very sparsely punctured; second segment with about nine irregular transverse carinæ. Pygidium truncate posteriorly, longitudinally striated, about half as long again as broad, sides nearly parallel. Fifth ventral segment longitudinally striated. Ferruginous-red; truncation of median segment and abdomen above black; an interrupted band on first, third and fourth segments and a spot on each side of second and fifth segments yellow. Pygidium ferruginous. Length 9 mm.

Hab.—Swan River. Types in Brit. Mus.

131. T. (Lophocheilus) senex Sm.

Thynnus senex Sm., Cat. Hym. B.M. p.19, n. 36, 1859(♂).

♂. Clypeus broad, convex, broadly truncate at apex, a small, oblique, broadly triangular truncation before apex in middle, giving it an appearance of emargination; finely punctured. Head rugulose, interantennal prominence very little developed; a shining, longitudinal line below anterior ocellus. Pronotum long, anterior margin raised with a deep groove behind it. Thorax and median segment finely rugulose. Median segment obliquely depressed, rounded, with a deep depression on each side near basal angles. Abdomen elongate-fusiform, the groove between first and second ventral segments very shallow. Hypopygium triangular, with an apical spine and slight rounded projections at basal angles.

Hab.—West Australia(Smith).

132. T. (Lophocheilus) connectens Sm.

Thynnus connectens Sm., Cat. Hym. B.M. vii p.45, n. 131, 1859(♀).

♀. Allied to the female of *T. protervus* Sm., from which it differs as follows. Head and thorax almost smooth, mesonotum

much broader, median segment coarsely and sparsely punctured, obliquely truncate from some distance behind mesonotum; first abdominal segment short and broad, without transverse striæ; carinæ on second segment rather more irregular and striæ on pygidium rather stronger.

Hab.—Perth, W.A.

133. T. (Lophocheilus) inconstans Sm.

Thynnus inconstans Sm., Cat. Hym. B.M. vii.p.26,n.66,1859(♂).
Thynnus signatus Sm., *l.c.* p.44, n.126, 1859(♀).

♂. Clypeus produced and broadly truncate at apex, rounded at base. Head, thorax, and median segment finely rugulose, disc of mesonotum and scutellum punctured. Abdomen sparsely punctured, slender, first segment oblique and very narrow at base, with a strong sulcus from base not reaching apex; segments 2-5 with a deeply impressed transverse line near base, apical margins depressed, leaving a raised mark before apex curved on sides and deeply emarginate in middle. Hypopygium with a strong rounded projection on each side at basal angles, thence elongate-triangular to apical spine.

♀. Head much broader than long, strongly rounded at posterior angles, deeply and rather sparsely punctured, with a faint, longitudinal, frontal sulcus. Pronotum rectangular, about half as broad again as long, almost smooth, with a few large punctures, each with a hair springing from it, along anterior and lateral margins. Median segment smooth, obliquely truncate posteriorly. Abdomen smooth, with a few large scattered punctures, first segment vertically truncate at base, with a transverse carina just before apex and apical margin raised. Second segment with many transverse carinæ, those near apex strongly raised, those near base irregular and not very distinct. Pygidium deflexed and vertically truncate posteriorly, longitudinally striated, about twice as long as broad, sides parallel. Fifth ventral segment longitudinally striated on apical half.

Hab.—S. E. Australia.

134. T. (Lophocheilus) flavipennis Sm.

Thynnus flavipennis Sm., Cat. Hym. B. M. vii. p. 21, n. 39, 1859 (♂).

♂. Clypeus convex, truncate at apex and sparsely punctured. Head and thorax closely and finely punctured, clothed above with fulvous pubescence, which is rather dense on pro- and meso-notum, the pubescence beneath thin and grey. Median segment shining, very finely rugulose, smooth at base. Abdomen elongate, third and fourth segments a little the broadest, smooth and shining, with a few scattered and minute punctures; segments 2-6 with an impressed transverse line near base. Epipygium rounded at apex, with a few curved striæ; hypopygium with basal angles bluntly prominent, broad and rounded, broadly subtruncate at apex, with a very short apical spine.

♀. Head convex, broader than long, strongly rounded at posterior angles, rather strongly but not very closely punctured, front between antennæ rugose with a short and feeble longitudinal sulcus. Thorax and median segment very finely punctured; pronotum almost as large as head, subrectangular, about half as broad again as long. Median segment obliquely truncate posteriorly. Abdomen very sparsely punctured, second segment with many (about fourteen) more or less irregular transverse carinæ, those near base very delicate, the two at apex rather more elevated. Pygidium not contracted, vertically truncate posteriorly and longitudinally striated, surface of truncation about twice as long as broad, sides parallel and produced into spines near apex, extreme apex narrower and smooth. Ferruginous-brown; truncation of median segment black. In some specimens the abdominal segments are stained with black. Length 11 mm.

Hab.—New South Wales.

The colour of the male is variable, some specimens being without the reversed barb-shaped spot mentioned by Smith. The abdominal segments are black at the base.

135. T. (Lophocheilus?) opposítus Sm.

Thynnus oppositus Sm., Descr. n.sp. Hym. p.162, n.12, 1879(♂).

♂. Clypeus broadly truncate anteriorly, very finely and closely punctured, a very delicate carina from base not reaching middle. Head, thorax and median segment very finely and closely punctured; a short, delicate, longitudinal carina below anterior ocellus. Abdomen shining, finely and shallowly punctured, segments not constricted; first segment truncate anteriorly, with a large blunt tubercle above truncation. Hypopygium with basal angles slightly prominent, thence broadly produced, rounded at apex, with an acute apical spine.

Hab.—Swan River, W.A.(Smith).

136. T. (Lophocheilus) apterus Oliv.

Myzine aptera Oliv., Encycl. Méthod. Insect. viii. p.137, n.7, 1811(♀).

Thynnus variabilis Kirby, Trans. Linn. Soc. Lond. xii. p.476, 1818(♂♀); Leach, Journ. de Physique, lxxxviii. p.178; n.2, 1819 (♂).

Myrmecodes flavoguttatus Latr., Nouv. Dict. Hist. Nat. Ed.2ª, xxii. p.143, 1819(♀).

Thynnus olivieri Erichs., Arch. f. Naturg. viii. P.1, p.262, n.235, 1842(♂♀).

Myrmecodes olivieri Lepel., Hist. Nat. Insect. Hym. iii. p.588, n.2, 1845(♀).

Var. *Thynnus audax* Sm., Trans. Ent. Soc. Lond. 1868, p.234, n.6(♂).

This is a common and exceedingly variable species. As far as I can see, the markings on the male are of no value for specific distinction, though it is possible that a long series would show that some of the variations are more or less local. *T. audax* Sm., is a variety in which the usual black groundcolour is replaced by ferruginous, and the yellow markings by a lighter shade of ferruginous. A fine variety from Queensland in Mr. Froggatt's

Collection has the two basal abdominal segments wholly orange-yellow, and the other segments wholly black.

I have seen a large number of females, but hardly any with accurate data as to locality, or taken in copula. They vary much, most markedly in the number and development of the carinæ on the second abdominal segment, so much so that I should have assigned the extreme forms to different species without any doubt had I seen no intermediate gradations. A large series with full data is much needed for a thorough knowledge of this species.

Hab.—Southern Australia from Albany, W.A., to Southern Queensland.

137. T. (Lophocheilus) hyalinatus Westw.

Thynnus hyalinatus Westw., Arc. Ent. ii. 2, p. 106, P. 74, figs. 3, 4, 1844(♂♀).

Thynnus westwoodi Lep., Hist. Nat. Insect. Hym. iii. p 566, n. 1, P. 35, fig. 6, 1845(♂).

Thynnus graffii D.T., Cat. Hym. viii. 107, 1897(♂).

Hemithynnus hyalinatus Ashm., Canad. Ent. xxxv. 1903(♂♀).

This species has the thorax of the male black, with the posterior margin of the pronotum ferruginous. The limits of the species in the direction of *T. apterus* Oliv., are extremely ill-defined, and I fail to find any good point of distinction in the female.

The specimens I have seen are much smaller than *T. apterus*, of which it may prove to be a local variety.

Hab.—Tasmania; Lambton, N. S. W. (Schneider).

138. T. (Lophocheilus) maculosus Sm.

Thynnus maculosus Sm., Cat. Hym. B.M. vii. p. 16, n. 18, 1859(♂).

This species resembles *T. apterus* in appearance, but the antennæ are much shorter, and the scutellum is longer. The nervure dividing the first cubital cell branches on the cubital

nervure. The hypopygium is damaged in the type, and the mouth-parts have been removed.

Hab.—Australia(Smith).

139. T. (Lophocheilus) annulatus Kirby.

Thynnus annulatus Kirby, Trans. Linn. Soc. xii. 2, p. 476, 1818(♂).

Thynnus brownii Leach, Journ. de Physique lxxxviii. p. 178, 1819(♂).

Myrmecodes australis Gray, Griffith's Anim. Kingd. xv. p. 516, 1832(♀).

Thynnus brownii Westw., Arc. Ent. ii. 2, p. 113, P. 76, fig. 1, 1844(♂).

♂. Clypeus bell-shaped, but somewhat rounded anteriorly and strongly bent inwards at the apical angles. Hypopygium very broadly truncate, not reaching beyond the epipygium, except a short, narrow process to the base of the apical spine.

♀. The second abdominal segment has about thirteen transverse carinæ, those near apex most elevated, those near base irregular. Fifth ventral segment longitudinally striated on apical half. Pygidium truncate posteriorly, longitudinally striated, with a spine on each side parallel to the lateral margin.

Hab.—S.W. Australia.

140. T. (Lophocheilus) affinis Guér.

Thynnus affinis Guér., Voy. Coq. Zool. ii. 2, p. 226, 1830[1839](♂).

♂. There is a specimen in the British Museum which I assign to this species with some doubt. It is allied to *T. annulatus* Kirby, from which it differs in the shape of the hypopygium which is subtriangular, with an acute apical spine; and in the epipygium which is less strongly striated and not deflexed. There is a yellow spot on each side of all the abdominal segments, not of the first five only as in Guérin's type. The clypeus is shaped as in *T. annulatus*.

Hab.—Albany, W.A.

Subgenus Macrothynnus, n.subgen.

♂. Labrum broad and full as in *Thynnus*, from which it may be distinguished by the antennæ which are slender at the apex.

♀. Pygidium truncate posteriorly and broadly oval, not contracted before or on the truncation.

This group consists of a few very large species, two of which, *T. friederici* D.T., and *T. poultoni*, may have to be separated when closer examination is possible.

Type, *Thynnus simillimus* Sm.

141. T. (Macrothynnus) simillimus Sm.

Thynnus simillimus Sm., Cat. Hym. B. M. vii. p. 15, n. 12, 1859(♂).
Thynnus molitor Sm., *l.c.* p. 43, n. 120, 1859(♀).

♂. Clypeus broad, truncate at apex, rugose. Head, thorax and median segment rugulose; median segment short, truncate from a little behind postscutellum, rounded at sides and covered with grey pubescence. Abdomen very closely covered with minute punctures, first segment as broad as second. Hypopygium with slight prominences at basal angles, very broad and rounded to apex, with a very short apical spine. Wings fusco-hyaline, with a purple sheen.

♀. Head coarsely and rather sparsely punctured, not quite as broad as pronotum. Thorax and abdomen sparsely and finely punctured, the four apical abdominal segments smooth at base. First abdominal segment with the apical margin raised and several transverse striæ before it. Second segment crossed near middle by eight transverse carinæ between two rather more elevated transverse carinæ, the apical margin raised, with four very small transverse carinæ just before it, and seven or eight very fine transverse carinæ near base, the whole forming a continuous series. Fifth ventral segment coarsely longitudinally striated, smooth at base. Pygidium smooth at base, not much contracted, vertically truncate posteriorly, with many arched carinæ on the surface of the truncation, which is large and oval; epipygium reflexed at apex.

Hab —Sydney to Brisbane.

I sink *T. molitor* as the female of *T. simillimus* with very little hesitation, though I do not know that they have been taken coupled. Both sexes of the West Australian species *T. insignis* Sm., are very nearly related to this species. *T. molitor* cannot be the female of *T. klugii* Westw., as suggested by Smith, the localities being widely different; also the real female of *T. klugii* is now in the British Museum Collection.

142. T. (Macrothynnus) insignis Sm.

Thynnus insignis Sm., Cat. Hym. B.M. vii. p.15, n.11,1859(♂).

♂. Clypeus broadly truncate at apex, sparsely punctured, with obscure, arched, transverse rugæ. Head, thorax and median segment with dense pubescence, that on the front, pronotum and disc of mesonotum fulvous, elsewhere grey. Head finely and very closely punctured, mesonotum rugose. Median segment almost vertically truncate from postscutellum. Abdomen smooth and shining, broadest at base. Hypopygium slightly prominent at the basal angles, thence very broadly subtriangular to base of the small apical spine.

♀. Head half as broad again as long, strongly rounded at posterior angles, shining, sparsely and deeply punctured, most closely between antennæ; clypeus with a short carina at its base, anterior margin straight. Pronotum smooth, anterior margin straight, with a row of deep punctures, about twice as broad as long, a little narrowed posteriorly and broadly emarginate. Mesonotum and median segment sparsely punctured, median segment widened from base, almost vertically truncate posteriorly. Abdomen large, very sparsely punctured; first segment vertically truncate anteriorly, apical margin raised, with a broad groove before it, giving the appearance of a transverse carina before apex; second segment with the apical margin raised, with a broad groove before it, the rest of the segment occupied by about ten broken and irregular, low, transverse carinæ between two more elevated carinæ. Pygidium vertically truncate posteriorly, smooth and shining at base, with strong, curved striæ above base

of truncation, surface of truncation elongate-ovate, with strong longitudinal striæ on basal half. Fifth ventral segment longitudinally striated. Ferruginous-brown, mesonotum, median segment, second dorsal abdominal segment, base of third and pygidium black. Length 21 mm.

Hab.—Swan River, W.A.(Smith). Allied to *T. simillimus* Sm.

143. T. (Macrothynnus) friederici D.T.

Thynnus klugii Westw., Arc. Ent. ii. 2, p. 140, P. 82, fig. 1, 1844(♂).
Thynnus friederici D.T., Cat. Hym. viii. 107, 1897(♂).

♂. Clypeus strongly convex, depressed and very broadly truncate at apex, rugulose; interantennal carina broadly rounded at apex, a delicate carina from anterior ocellus nearly reaching base of clypeus. Head and thorax finely rugulose, the pubescence close and short, fulvous above and grey beneath; scutellum excavated on disc, with a subtubercular elevation on each side of the concave space. Median segment oblique, punctured-rugulose, with long grey pubescence. Abdomen almost smooth; first segment not quite as broad at apex as the second. Epipygium long, deflexed, broadly truncate at apex, coarsely striated, striæ curved at apex. Hypopygium broad at base, sharply narrowed and produced into a blunt, strongly recurved process. Length 38 mm.

The mandibles are very strongly bidentate, with a very long beard on the outer margin, the sides of the head with a fringe of long hairs; the antennæ slender at the apex; the anterior coxæ concave at their base; the spur on the anterior tibiæ strongly developed; hind femora swollen in the middle and subtuberculate.

♀. Mandibles long, bearded on outer margin, strong but not blunt at apex. Clypeus broadly but slightly emarginate at apex, with a carina from base to centre. Head sparsely punctured on vertex, more finely and closely on front, with a deep longitudinal frontal sulcus, which is very broad between the antennæ, where the front on each side of it is produced into an acute tubercle. Eyes oval, situated very near base of mandibles. Pronotum punctured-rugose, subrectangular, slightly narrowed posteriorly, anterior angles acute, broader than long. Median segment

obliquely truncate posteriorly. The horny spur at apex of anterior tibiæ is as long as the two basal joints of the tarsus combined; and the basal joint of the anterior tarsi is strongly emarginate near the base. Abdomen strongly and rather sparsely punctured; first segment rugose, apical margin very slightly raised, with a narrow and shallow groove before it; second segment with the apical margin strongly raised and a delicate transverse carina near base, the intervening space transversely rugose-carinate. Pygidium not contracted, vertically truncate posteriorly, the face of the truncation oval and longitudinally striated. Fifth ventral segment transversely striated. Entirely fuscous. Length 27 mm.

Hab.—Swan River, W.A. Type of ♀ in British Museum.

Westwood suggests that his *T. gravidus* may be the female of this species, and Smith suggests *T. molitor*. The female described above was placed with the males in the British Museum Collection, and I feel no doubt as to the correctness of the sexing.

144. T. (Macrothynnus) poultoni, n.sp.

♂. Very nearly allied to *T. friederici* D.T., from which it differs in the following points: clypeus less convex and broadly emarginate at apex, and entirely black; pronotum slightly narrower and also entirely black, mesonotum more deeply sculptured; disc of scutellum coarsely rugose and much less concave than in *T. friederici*; median segment obliquely truncate from postscutellum: first abdominal segment broader and shorter; sculpture of epipygium coarser and the striæ much less regular, and it is much more narrowly truncate at the apex, and the hypopygium is much longer, though otherwise similar in shape. Structure of the posterior femora similar in the two species. Length 35 mm.

Hab.—Western Australia (Du Boulay); probably from the Champion Bay district. Type in British Museum.

145. T. (Macrothynnus) dilatatus Sm.

Thynnus dilatatus Sm., Cat. Hym. B.M. vii. p. 43, n. 121, 1859 (♀).

♀. Head rather small, subopaque, much broader than long. Pronotum slightly emarginate anteriorly, broader than head,

subrectangular, a little broader than long. Thorax and median segment sparsely punctured; median segment almost vertically truncate posteriorly. First and second abdominal segments with the apical margin raised, and covered with many low and more or less irregular transverse carinæ; the three following segments with scattered punctures. Fifth ventral segment longitudinally striated. Pygidium vertically truncate posteriorly, with a few curved carinæ above and on the base of the truncation, surface of the truncation broadly oval, subtruncate at apex. Intermediate tibiæ very much dilated. Entirely black; legs and antennæ fuscous.

Hab.—Australia(Smith); N.W. Coast(British Museum).

Nearest to *T. novarcæ* Sauss., but the pygidium in the present species is not sharply contracted before the truncation, on which account I place it in this group, but consider that it may very likely belong to one of the species of *Thynnus* proper.

Subgenus Thynnus.

Thynnus Fab., Syst. Ent. p.360, n.113, 1775.
Myrmecodes Latr., Gen. Crust. et Insect. iv. p.118, n.521, 1809.
Thynnoides Guér., Voy. Coq. Zool. ii. 2, p.214, 1830(1839).
Zaspilothynnus Ashm., Canad. Ent. xxxv. 1903.
Thynnides Ashm., *l.c.*
Thynnidea Ashm., *l.c.*
Tachynomyia Ashm., *l.c.*(nec Guér.).
Guérinius Ashm., *l.c.*
Homalothynnus Enderlein, Zool. Anzeiger, xxvii. p.466, 1904.

♂. Labrum broad and full, rounded at sides and very slightly narrowed at base. Joints of maxillary palpi subequal; antennæ of nearly even thickness throughout, not slender at apex. Second recurrent nervure received at a considerable distance from base of third cubital cell.

♀. Pygidium more or less sharply contracted at base of posterior truncation or on the truncation. Maxillary palpi usually two-jointed, but in *Thynnoides fulvipes* Guér., they are three-jointed.

I do not consider the distinctions given by Guérin for *Thynnoides* are sufficiently marked when a large number of species are examined.

Type, *Thynnus dentatus* Fab.

Ashmead's subgenera are very misleading; his species taken for the types are often wrongly identified, and the pairing is usually inaccurate. *T. pedestris* Fab., being the type of *Myrmecodes* Latr., that name must sink, as *pedestris* is undoubtedly a true Thynnus.

146. Thynnus dentatus Fab.

Thynnus dentatus Fab., Syst. Ent. p.360, n.1, 1775(♂); Smith, Cat. Hym. B.M. vii. 11, 1859(♂); Latr., Gen. Crust. et Insect. i. T.13, f.2-4, 1806(♂).

Smith gives a fair description of the male. Median segment vertically truncate and overlapped by scutellum and postscutellum. Abdomen conical, first segment truncate at base and not divided by a groove from the second beneath. Dorsal plate of apical segment longitudinally striated, narrowly emarginate at apex.

♀. Head smooth and shining, strongly rounded at posterior angles, front deeply excavated above base of antennæ, the concave area, extending two-thirds of the distance to the posterior margin, divided by a broad longitudinal carina, the surface of which is hollowed, longitudinally striated and thinly clothed with long hairs; on each side near base of carina, about half-way to eye, is a cluster of deep punctures from which spring a few long hairs. Eyes oval, not reaching base of mandibles. Pronotum as wide as head, anterior margin straight, narrowed posteriorly and broadly emarginate on posterior margin; covered with large shallow punctures, a row of deeper punctures along anterior margin from each of which springs a hair. Mesonotum small and smooth; median segment short, almost smooth, obliquely truncate posteriorly. First abdominal segment vertically truncate anteriorly, the surface of the truncation concave, a transverse carina just before the apex of the segment and a cluster of

deep punctures with long hairs springing from them in the middle of the apical margin. Second segment above with nine transverse carinæ, including the recurved apical margin; the three following segments smooth, with a few large punctures near apex, the fifth deeply emarginate at apex above and beneath, strongly obliquely striated beneath. Pygidium contracted near base, very narrow, transversely striated between marginal carinæ on the contracted portion, thence obliquely truncated and slightly widened to apex, where it is narrowly emarginate. Black; a spot above base of antennæ, a spot on side of prothorax near anterior angle, mesothorax, a broad band above the truncation of first abdominal segment, a spot on each side of second segment, a band broadly interrupted on middle of third segment, curved on sides and nearly reaching apical margin, a spot on each side near apical angles of fourth and fifth segments and a line at base of anterior tibiæ yellow. Length 13 mm.

Hab.—Cooktown(Turner); Cairns, Q.(Nugent)♂; Lizard Island, Q., ♂♀(Brit. Mus.).

147. T. PULCHRALIS Sm.

Thynnus pulchralis Sm., Cat. Hym. B.M. vii. 68, 1859(♂); Sm., Brenchley's Cruise of the Curaçoa, P.43, fig.4, 1873.

This very variable species is close to *T. dentatus* Fab., of which it may possibly prove to be a variety. The colour in both species is very variable, nor is the darker colour of the wings in *T. pulchralis* a constant character. Both forms occur at Cooktown, but I have not seen *T. dentatus* from any locality south of Cairns. I have taken a specimen at Mackay almost intermediate in colour, which may prove to be another species, as the hypopygium is subconical at the apex instead of truncate or toothed.

The female can only be distinguished from that of *T. dentatus* by the rather more strongly raised and regular carinæ on the second abdominal segment, but a long series may show this to be a variable character.

Hab.—Adelaide, S.A., to Cooktown, Q.

148. T. VENTRALIS Sm.

Thynnus ventralis Sm., Trans. Ent. Soc. London (3) ii. 5, p.389, 1865.

Thynnus smithii Frogg., Proc. Linn. Soc. N.S. Wales (2) vi. p.16, 1891(♂).

Thynnus conspicuus Sm., Brenchley's Cruise of the Curaçoa p.457, P.43, fig.3, 1873(♂)[nec *T. conspicuus* Sm., Trans. Ent. Soc. 1868].

Thynnus wackernellii D.T., Cat. Hym. viii. 118, 1897(♂).

Homalothynnus eburneus Enderlein, Zool. Anzeiger, xxvii. p.468, 1904.

♂. Clypeus punctured, anterior margin almost straight between the toothed apical angles, base narrowly truncate, joined by a continuation of the interantennal prominence. A short longitudinal sulcus from anterior ocellus. Pronotum broadly emarginate anteriorly. The scutellum and postscutellum overlap the median segment, projecting beyond the vertical truncation. Abdomen conical. The whole insect shining, smooth, with minute punctures, abdomen more strongly punctured beneath. Dorsal plate of apical segment longitudinally striated above, emarginate at apex. Hypopygium obliquely striated above, punctured beneath, with a lateral tooth on each side near base, apical margin narrowly truncate with a strong apical spine. Apical margin of hypopygium varying a little in form as in *T. dentatus*.

♀. Head almost smooth, with a large shining depression on each side above base of antennæ, the broad ridge between the depressions with a longitudinal carina and raised marginal carinæ; a small space above each depression coarsely punctured, with a few long hairs. Pronotum sparsely punctured, narrowed posteriorly, anterior margin straight, posterior margin broadly emarginate. Mesothorax almost smooth, a small cluster of punctures with a few long hairs near base. Median segment short, almost vertically truncate posteriorly, sparsely punctured. Abdominal segments almost smooth above, the first vertically

truncate anteriorly with a median sulcus on the truncation, a cluster of punctures with long hairs in middle of apical margin; second segment with nine prominent transverse carinæ, including the recurved apical margin; pygidium narrow, contracted near base, the contracted portion transversely striated, truncate posteriorly, surface of the truncation elongate-oval, and emarginate at apex. Abdomen beneath strongly but irregularly punctured and pubescent, fifth segment coarsely striated. Black; clypeus, depressions at base of antennæ, sides of prothorax near anterior angles, mesothorax, except a transverse line near base, a broad transverse band on first abdominal segment, a spot on each side of second, a band near apex of third, emarginate in middle, a transverse band almost interrupted on each side of fourth, a spot on each side of fifth on apical margin, head and thorax beneath, apical half of the two basal segments of abdomen beneath, a spot on each side of the three following segments and legs yellow; coxæ and femora above and tibiæ beneath black. Antennæ and fifth abdominal segment beneath fuscous. Length 17 mm.

Hab.—King's Sound, N.W.A.(Froggatt), Roebourne, N.W.A. ♂♀(French).

A very plentiful species, but I have seen only one female.

Smith calls *T. ventralis* a female, but describes a male. The type is not available, but I think the name must apply to this species.

149. T. EMARGINATUS Fab.

Thynnus emarginatus Fab., Syst. Ent. 360, 2, 1775(♂ as ♀).

♂. Clypeus truncate anteriorly, the angles not produced. Pronotum short, narrowed anteriorly, anterior margin raised and as broad as head. Thorax and scutellum shining; mesonotum much broader than long; scutellum very large, broadly rounded posteriorly, postscutellum produced much beyond the vertically truncate median segment, narrowly and deeply emarginate at apex. Abdomen broad at base, gradually tapering to apex; first segment vertically truncate anteriorly; sixth ventral segment with a short spine on each side at apical angles. Hypopygium

broad at base, with a spine on each side, thence sharply narrowed to apex, the apical angles produced into short spines, with the usual central spine. Ferruginous-brown; mandibles, clypeus and posterior margin of pronotum yellow; scutellum fuscous at base and apex; abdominal segments with a pale ferruginous transverse band on each side. Wings hyaline, nervures fuscous. Length about 18 mm.

Hab.—Australia(Banks).

The type, probably taken at Cooktown, seems to be still unique. The hypopygium resembles that of *T. dentatus*.

150. T. PEDESTRIS Fab.

Tiphia pedestris Fab., Syst. Ent. p. 354, 8, 1775(♀).

Myrmecodes pedestris Latr., Gen. Crust. et Insect. iv. p.118, n.521, 1809(♀)[nec Ashm., Canad. Ent. xxxv.].

♀. Head shining on vertex with a few shallow punctures; front with a large and very shallow depression on each side divided by a faint longitudinal carina, the carina clothed with long hairs, a few long hairs on the depressions. Thorax shining, with sparse and scattered punctures; pronotum short, rather narrower than head, straight on anterior margin, strongly and broadly emarginate posteriorly. Median segment very short, almost vertically truncate from just behind mesonotum, angles at base of truncation prominent. Head black; front and outer margin of eyes yellow. Thorax yellow above, margins of pronotum black. Tibiæ and tarsi yellow. [Abdomen missing].

Hab.—Australia(Banks).

This is the female of a Thynnus of the typical group, but the depressions on the front are not deeply excavated as in *T. dentatus*, and the pronotum is shorter and more deeply emarginate posteriorly. It is nearer to *T. vernalis* described by me in this paper, and may prove to be the opposite sex of *T. emarginatus* Fab. Ashmead's remarks on *Myrmecodes pedestris* seem to refer to *T. apterus* Oliv.

151. T. BRENCHLEYI Sm.

Thynnus brenchleyi Sm., Brenchley's Cruise of the Curaçoa, p.456, P.43, fig.2, 1873(♂).

♂. Clypeus broadly truncate at apex, apical angles produced into short spines, pointed at base and almost extending to apex of the interantennal prominence. Head and thorax shining, finely punctured, very sparsely on the mesonotum and scutellum, the scutellum produced at apex into a fine tubercle, overhanging postscutellum and median segment. Abdomen elongate-conical, shining, finely punctured, sixth segment with a spine on each side at apical angles beneath, dorsal plate of apical segment longitudinally striate, broadly truncate at apex. Hypopygium with a spine on each side at base, thence subtriangular with an apical spine, transversely striated above. First segment beneath prominent at base.

Smith gives a good figure, but his description, as usual, is almost confined to colour.

♀. Mandibles broad and flattened at base, pointed at apex, with a minute tooth near middle of inner margin, external margin fringed with long hairs. Clypeus and head strongly punctured, head smooth on vertex and with a smooth, shallow depression on each side above base of antennæ, the space between the depressions broad, with a longitudinal carina which extends to base of clypeus. Front very strongly punctured, with long cinereous pubescence, posterior margin of head broadly emarginate. Pronotum as broad as head, broadly emarginate anteriorly, shallowly punctured, with a row of deeper punctures on anterior margin, from each of which springs a long hair. Mesonotum very narrow, rounded posteriorly, punctured, and clothed, except on anterior margin, with long, dense, cinereous pubescence. Median segment very short, almost vertically truncate posteriorly, smooth. First abdominal segment vertically truncate anteriorly, surface of truncation smooth, slightly concave, with a median sulcus, dorsal surface densely clothed at base with long fulvous pubescence, transversely striate, with a transverse carina before apex and apical margin

recurved. Second segment with about nine transverse carinæ, including the recurved apical margin, those near base irregular and less prominent. The remaining segments smooth above. Abdomen beneath strongly punctured, with long thin pubescence; fifth segment coarsely longitudinally striated, emarginate. Pygidium compressed, truncate posteriorly, strongly narrowed just before truncation and transversely rugulose, smooth at base, surface of truncation elongate-oval, smooth. Black; depressions above antennæ, sides of prothorax anteriorly, a line at base of mesonotum interrupted in middle, a spot on each side of second and fifth abdominal segments, a broad band near apex of third and fourth; anterior portion of head beneath, prosternum and mesosternum, first abdominal segment in middle, a deeply emarginate band on second, a large spot on each side of third and fourth, coxæ beneath, a spot at base of trochanters and an obscure line at base of tibiæ yellow. Mandibles, except apex, tibiæ and tarsi fusco-ferruginous. Length 20 mm.

Hab.—Champion Bay, W.A.(Smith); Narrabri, N.S.W.(Froggatt); Mackay, Q.(Turner; ♂♀ in cop.).

152. T. ochrocephalus Sm.

Thynnus ochrocephalus Sm., Trans. Ent. Soc. London, 1868, 231(♂).

This is very near *T. brenchleyi*. It differs in the colour on the head and pronotum being ochraceous instead of yellow, also in the want of colour beneath. The clypeus is much more strongly longitudinally striated and less produced at the apical angles; there is a carina in the middle of the interantennal prominence. The scutellum is broadly subtruncate at the apex, not produced over the postscutellum, which reaches but does not project beyond the truncation of the median segment. The first abdominal segment beneath is obliquely, triangularly truncated at the apex, with a groove separating it from the second segment. The hypopygium is broader and shorter than in *T. brenchleyi*, and the

whole insect is finely and much more closely punctured and opaque.

Hab.—Champion Bay, W.A.(Smith).

153. T. DARWINIENSIS, n.sp.

♂. Clypeus produced at apical angles into short spines, broadly emarginate between the spines, the emargination broken in the centre by a slight projection; sparsely punctured, prominent and pointed at base. Head finely and closely punctured, a short, V-shaped carina between antennæ, apex touching base of clypeus; a very fine longitudinal sulcus from apex of carina nearly reaching anterior ocellus. Pronotum finely punctured, most closely at sides. Disc of mesonotum and scutellum sparsely punctured, mesonotum with the usual two lateral sulci, the space between the sulci very finely and closely punctured. Median segment vertically truncate, finely punctured on sides, scutellum and postscutellum broadly rounded posteriorly, postscutellum reaching to the truncation of median segment, but not projecting beyond it. Mesopleuræ very finely punctured, clothed with short white pubescence. Abdomen shining, rather sparsely punctured, segments smooth on apical margin. First segment vertically truncate anteriorly, with a shallow median sulcus on truncation, as broad as second segment. Sixth segment beneath with a lateral spine at apical angles. Dorsal plate of epipygium coarsely longitudinally striated, emarginate at apex. Hypopygium with a prominent spine on each side near base, thence strongly narrowed, apical angles produced into short blunt spines at base of the strong apical spine. Abdomen beneath more coarsely punctured, with fine grey pubescence. Black; clypeus, labrum and mandibles pale yellow, mandibles ferruginous at apex; carina between antennæ, a small spot below anterior ocellus, two minute spots on vertex and margins of eyes narrowly interrupted at apex ochraceous-brown, margins of prothorax luteous-yellow; two oblique lines on each side of mesothorax, posterior margin of scutellum, the whole of postscutellum narrowly interrupted near the anterior angles and the truncation

of median segment ochraceous-brown. Thorax beneath light ochraceous-brown, mesopleuræ black with an ochraceous line below base of primaries. Coxæ, femora and trochanters beneath, anterior tibiæ and tarsi ochraceous, posterior tibiæ fuscous. The truncation of first abdominal segment, a narrowly interrupted median transverse band on segments 2-6 pale yellow, median interruption broader on apical segments; the five basal segments beneath with an obscure black apical spot and a band on apical margin of sixth pale yellow. Wings hyaline, nervures testaceous-brown, tegulæ luteous-yellow. Length 16 mm.

Hab.—Port Darwin (G. Turner).

Most nearly allied to *T. nigropectus* Sm., but is much less strongly punctured. The colour is also different and less extensive.

154. T. zonatus Guér.

Thynnus zonatus Guér., Voy. Coq. ii. 2, p.222, 1830 [1839] (♂).

Thynnus nigropectus Sm., Descr. n.sp. Hym. B.M. p.165, n.19, 1879 (♂).

This is near *T. darwiniensis*, but is much larger; the whole insect is closely punctured, the coloured areas are more extensive, especially on the abdomen, and of a much brighter yellow. The abdomen is of a much more elongate shape. The hypopygium has two spines on each side; Smith says it is trifid. The colour of the mesothorax and abdomen differs slightly from Guérin's description, but I think my determination is correct. Guérin gives the length as 27 mm. I have a specimen measuring 23 mm., but Smith's type is smaller.

Hab.—Swan River (Smith), Roebourne, N.W.A. (French). Guérin gives no locality.

155. T. elgneri n.sp.

♂. Clypeus large, very broadly truncate at apex, finely longitudinally striated, pointed at base and touching interantennal prominence, which is very widely V-shaped. Head strongly punctured, anterior ocellus situated in a small depression. Thorax less strongly punctured than head; scutellum broadly

rounded at apex; median segment obliquely truncate from postscutellum. Abdomen rather closely punctured; first segment obliquely truncate anteriorly; second segment a little broader than first or third. Sixth ventral segment with a spine on each side at apical angles. Hypopygium with a broad spine on each side near base, thence sharply narrowed and produced, emarginate at apex, with a short spine at each of the angles and a strong central spine. Black; mandibles, clypeus, interantennal prominence, except a black median line not reaching apex, margins of eyes very narrowly interrupted at summit, an interrupted transverse line on vertex, margins of pronotum, tegulæ, a large quadrate spot on posterior margin of mesonotum, mesopleuræ, except a large black spot beneath posterior wing, apical half of scutellum, postscutellum, median segment except a broad black line on each side, a transverse band on the six basal abdominal segments above, interrupted in middle except on first segment, apex of first ventral segment, the whole of the three following segments and apex of fifth yellow; legs ferruginous; anterior coxæ yellow. Wings hyaline, nervures black, stigma ferruginous. Length 11 mm.

Hab.—Cape York, Q. (Elgner). Type in Coll. Froggatt.

This species resembles *Agriomyia maculata* Guér., in colour, but not in any structural details.

156. T. SABULOSUS, n.sp.

♀. Head strongly rounded at sides, broadly emarginate posteriorly, vertex slightly convex and smooth, front strongly punctured, with long hairs and a strong, short, median carina; a rather shallow, smooth depression between base of antenna and eye, the eyes oval, reaching nearly to base of mandibles, the position of the posterior ocelli indicated by a large puncture on each side on vertex. Pronotum finely and very shallowly punctured, a row of deep punctures each with a hair springing from it along anterior margin, which is almost straight, hind margin broadly emarginate. Mesonotum punctured; median segment smooth, short and obliquely truncate posteriorly.

EUCALYPTUS CALEYI, Maiden (DROOPING IRONBARK.)

EUCALYPTUS CREBRA (on the right); E. CALEYI (on the left).

Proceedings for 1900—Part 1, 8s.; Part 2, 10s. 6d.; Part 3, 10s. 6d.; Part 4, 17s. 6d.

Proceedings for 1901—Part 1, 10s.; Part 2, 9s.; Part 3, 5s.; Part 4, 17s. 6d.

Proceedings for 1902—Part 1, 7s.; Part 2, 7s. 6d.; Part 3, 7s. 6d., Supplement, 3s; Part 4, 15s.

Proceedings for 1903—Part 1, 9s.; Part 2, 12s. 6d.; Part 3, 14s.; Part 4, 15s.

Proceedings for 1904—Part 1, 10s.; Part 2, 7s. 6d.; Part 3, 9s.; Part 4, 10s.

Proceedings for 1905—Part 1, with Supplement, 7s.; Part 2, 10s.; Part 3, 12s. 6d.; Part 4, with Supplement, 10s. 6d.

Proceedings for 1906—Part 1, 12s. 6d.; Part 2, 12s. 6d.; Part 3, 12s. 6d.; Part 4, 15s.

Proceedings for 1907—Part 1, 8s.; Part 2, 8s. 6d.; Part 3, 15s.; Part 4, 18s.

Proceedings for 1908—Part 1, 7s.

A reduction of 20 per cent. on the above charges is made to Members of the Society.

The MACLEAY MEMORIAL VOLUME [issued October 13th, 1893]. Royal 4to., LI. and 308 pages, with Portrait, and forty-two plates. Price £3 3s.

CONTENTS.

The Hon. Sir WILLIAM MACLEAY, Kt., F.L.S., M.L.C. : (By the Editor).

Professor W. BALDWIN SPENCER, M.A. : Contributions to our Knowledge of *Ceratodus*. Part I.—The Blood Vessels. (Plates I.-V.) — Prof. F. W. HUTTON, F.R.S. : The Pliocene Mollusca of New Zealand. (Pl. VI.-IX.) — Prof. W. A. HASWELL, M.A., D.Sc. : A Monograph of the *Temnocephaleæ*. (Pl. X.-XV.) — Prof. W. A. HASWELL, M.A., D.Sc. : On an apparently new Type of the *Platyhelminthes (Trematoda?)* (Pl. XVI.)— Prof. T. JEFFERY PARKER, D.Sc., F.R.S., and Miss J. G. RICH : Observations on the Myology of *Palinurus Edwardsii*, Hutton. (Pl. XVII.-XXI). — Prof. J. T. WILSON, M.B., Ch.M., and C. J. MARTIN, M.B., B.Sc : Observations upon the Anatomy of the Muzzle of the *Ornithorhynchus*. (Pl. XXII. XXIII.) — Prof. J. T. WILSON, M.B., Ch.M., and C. J. MARTIN, M.B., B.Sc. : On the Peculiar Rod-like Tactile Organs in the Integument and Mucous Membrane of the Muzzle of *Ornithorhynchus*. (Pl. XXIV.-XXVI.) — C. HEDLEY, F.L.S. : On *Parmacochlea Fischeri*, Smith. (Pl. XXVII.) — Prof. R. TATE, F.L.S., F.G.S., &c. : On the Geographic Relations of the Floras of Norfolk and Lord Howe Islands — Baron von MUELLER, K.C.M.G., F.R.S. : Notes on an Undescribed *Acacia* from New South Wales. (Pl. XXVIII.) — Baron von MUELLER, K.C.M.G., F.R.S., and J. H. MAIDEN, F.L.S., F.C.S. : Description of a New *Hakea* from Eastern New South Wales. (Pl. XXIX.) — R. ETHERIDGE, Jun. : A Description of some of the Weapons and Implements of the Alligator Tribe, Port Essington, North Australia (Pl. XXX.-XXXV.) — N. A. COBB, Ph.D. : New *Nematodes* from ji and Australia. (Pl. XXXVI.-XLII.)

DESCRIPTIVE CATALOGUE OF AUSTRALIAN FISHES. By William Macleay, F.L.S. [1881]. A few copies only. Price £1, net.

The TRANSACTIONS OF THE ENTOMOLOGICAL SOCIETY OF NEW SOUTH WALES, 2 vols., 8vo [Vol. I. five Parts, 1863-66; Vol. II. five Parts, 1869-73; all published], price £2, net, are also obtainable, but neither the Parts nor the Volumes are sold separately.

PROCEEDINGS, 1908, PART 1.

CONTENTS.

PAGE

Presidential Address delivered at the Thirty-third Annual General Meeting, March 25th, 1908, by A. H. S. Lucas, M.A., B.Sc. .. 1

Notes on the Native Flora of New South Wales. Part vi. Deepwater to Torrington and Emmaville. By R. H. Cambage, F.L.S. (Plates i.-ii.) 45

Note on the Breeding Habits of the Red-bellied Newt (*Molge pyrrhogastra* Boie). By Edgar R. Waite, F.L.S., Curator, Canterbury Museum, Christchurch, N.Z. 66

A Revision of the *Thynnidæ* of Australia [Hymenoptera]. Part ii. By Rowland E. Turner, F.E.S. 70

Balance Sheet, &c. 40

Elections and Announcements 38, 39, 44, 68

506
NES
v.33²
cop.2

5.9.06
11/14

Issued August 14th, 1908.

Vol. XXXIII.
Part 2.

No. 130.

THE

PROCEEDINGS

OF THE

LINNEAN SOCIETY

OF

NEW SOUTH WALES

FOR THE YEAR

1908.

PART II. (pp.209-456),

Containing Papers read in

APRIL (in part) to JULY (in part).

WITH FOUR PLATES.

STATE

SYDNEY:
PRINTED AND PUBLISHED FOR THE SOCIETY
BY
F. CUNNINGHAME & CO., 146 PITT STREET,
AND
SOLD BY THE SOCIETY.

[Price, 9/-]

AGENTS IN EUROPE
Messrs. DULAU & Co., 37 Soho Square, London, W.
Messrs. R. FRIEDLÆNDER & SOHN, Carlstrasse 11, Berlin, N.W.

NOTICE.

With the exception of Volumes I.-VI. of the Proceedings—of which the Society's stock was totally destroyed in the Garden Palace Fire—the Publications of the Linnean Society of N.S.W. may be obtained at the Society's Hall, Ithaca Road, Elizabeth Bay, Sydney, from Dulau & Co., 37 Soho Square, London, W., or R. Friedländer & Sohn, Carlstrasse 11, Berlin, N.W., at the following prices:—

First Series.

Proceedings for 1882, Vol. VII.—Part 1, 7s. 6d.; Part 2, 10s.; Part 3, 5s.; Part 4, 10s.

Proceedings for 1883, Vol. VIII.—Part 1, 10s.; Part 2, 5s.; Part 3, 7s.; Part 4, 8s.

Proceedings for 1884, Vol. IX.—Part 1, 8s.; Part 2, 12s.; Part 3, £1 5s.; Part 4, £1 5s.

Proceedings for 1885, Vol. X.—Part 1, 12s.; Part 2, 7s. 6d.; Part 3, 15s.; Part 4, 17s. 6d.

Second Series.

Proceedings for 1886, Vol. I.—Part 1, 10s. 6d.; Part 2, 12s.; Part 3, 13s.; Part 4, 12s. 6d.

Proceedings for 1887, Vol. II.—Part 1, 7s.; Part 2, 8s.; Part 3, 12s.; Part 4, £1 7s.

Proceedings for 1888, Vol. III.—Part 1, 15s.; Part 2, £1 4s.; Part 3, £1; Part 4, 18s.

Proceedings for 1889, Vol. IV.—Part 1, 11s.; Part 2, 16s.; Part 3, 19s.; Part 4, 11s.

Proceedings for 1890, Vol. V.—Part 1, 11s.; Part 2, 9s.; Part 3, 9s.; Part 4, 9s.

Proceedings for 1891, Vol. VI.—Part 1, 10s.; Part 2, 9s. 6d.; Part 3, 17s.; Part 4, 7s. 6d.

Proceedings for 1892, Vol. VII.—Part 1, 6s. 6d.; Part 2, 4s. 6d.; Part 3, 8s.; Part 4, 8s.

Proceedings for 1893, Vol. VIII.—Part 1, 5s.; Part 2, 11s.; Part 3, 6s.; Part 4, 9s.

Proceedings for 1894, Vol. IX.—Part 1, 12s.; Part 2, 12s.; Part 3, 13s.; Part 4, 8s.

Proceedings for 1895, Vol. X.—Part 1, 15s.; Part 2, 8s. 6d.; Part 3, 10s., Supplement, 1s. 6d.; Part 4, 12s.

Proceedings for 1896—Part 1, 9s., Supplement, 2s. 6d.; Part 2, 6s. 6d.; Part 3, 7s. 6d.; Part 4, £1 7s. 6d.

Proceedings for 1897—Part 1, 10s.; Part 2, 8s. 6d.; Part 3, 9s.; Part 4, 12s. 6d.

Proceedings for 1898—Part 1, 3s.; Part 2, 6s.; Part 3, 12s.; Part 4, 14s.

Proceedings for 1899—Part 1, 12s. 6d. Part 2, 12s.; Part 3, 10s.; Part 4, 10s. 6d.

Abdomen very sparsely punctured; first segment obliquely concavo-truncate anteriorly, with a faint, interrupted, transverse carina before apex, apical margin raised. Second segment with eight transverse carinæ, including the recurved apical margin, the apical carinæ the strongest. Pygidium smooth at base, vertically truncate posteriorly, contracted and transversely striated before the truncation, surface of truncation oval, slightly emarginate at apex, almost smooth. Fifth segment beneath longitudinally striated. Anterior tibiæ strongly notched at apex and produced into three spines. Pale yellow; mandibles, antennæ, tarsi, pygidium and fifth abdominal segment beneath fusco-ferruginous; front, sides and posterior margin of head united with a triangular mark on vertex, a transverse band close to anterior margin of pronotum and posterior margin narrowly, anterior margin of mesonotum, truncation of median segment, truncation and apical margin of first abdominal segment, second segment except a spot on each side, a curved mark on each side of third and fourth segments on apical margin and sides and base of the segments, fifth segment except a spot on each side near apical angles, base of first segment below, trochanters and femora above and tibiæ below black; apical margins of abdominal segments 2-4 beneath and a broadly triangular mark at apex testaceous. Length 17 mm.

Hab.—Adelaide River, Northern Territory. Type in Brit. Mus.

157. T. VESTITUS Sm.

Thynnus vestitus Sm., Cat. Hym. B.M. vii. p 15, 1859 (♂).

♂. Clypeus truncate anteriorly, shallowly punctured, connected by a fine carina with interantennal prominence, which is divided by a delicate longitudinal carina. The whole head finely punctured-rugulose, opaque, with a small shining mark below anterior ocellus. Pronotum with anterior margin raised and broadly emarginate, very shallowly and finely punctured-rugulose. Mesonotum and scutellum punctured, scutellum with a median longitudinal carina. Median segment closely

punctured, with a strong median sulcus from base to truncation, not covered at base by the postscutellum, obliquely truncate posteriorly, with long white pubescence, thickest on sides. First abdominal segment narrowed to base, obliquely concavo-truncate anteriorly, with a deep median sulcus on truncation, carinate beneath and truncate at apex, the carina produced into a small tubercle over truncation. The whole abdomen shallowly punctured, most closely and finely beneath. Sixth segment with a spine on each side at apical angles beneath. Dorsal plate of seventh segment above longitudinally striated, broadly subtruncate at apex; hypopygium with a strong spine on each side near base; [apex damaged in the type]. Otherwise as in Smith's description.

Hab.—Swan River, W.A. (Smith).

158. T. LEACHIELLUS Westw.

Thynnus leachiellus Westw., Arc. Ent. ii. 2, p.135, P.77, fig.1, ♂, P.83, fig.4, ♀, 1844.

Thynnus interruptus Westw., *l.c.* p.115 (nec Klug) [♂].

Zaspilothynnus leachiellus Ashm., Canad. Ent.xxxv. 1903 (♂♀).

♂. First abdominal segment beneath prominent in middle with an oblique triangular truncation at apex. There is a spine on each side of the sixth segment beneath at the apical angles, not of the fifth as Ashmead states.

♀. The depression on each side of head above antennæ very large, reaching to posterior margin. Ashmead seems to rely on this character in founding his genus *Zaspilothynnus*, but it is found in females of typical *Thynnus* allied to *T. dentatus*. Ashmead, with his usual inaccuracy, describes quite a different female in his generic description of *Thynnus*.

Hab.—Sydney, N.S.W.; Moreton Bay (Brit. Mus.).

A very common species.

159. T. VERNALIS, n.sp.

♂. Clypeus truncate anteriorly, apical angles very slightly prominent, punctured and with a little fine pubescence, which in

some lights gives the clypeus the appearance of being longitudinally striated; connected at base with the interantennal prominence by a short narrow carina. Head very finely rugulose in front, delicately punctured on occiput; the whole thorax finely punctured, scutellum higher than mesonotum with a depressed transverse line at base; median segment very finely rugulose, with grey pubescence, obliquely truncate from postscutellum. Abdominal sparsely punctured above, more coarsely beneath. First segment narrow at base, as broad at apex as second, beneath prominent in middle with a small oblique subtriangular truncation at apex. Sixth segment beneath with a spine at apical angle on each side. Dorsal plate of seventh segment coarsely longitudinally striated, rounded at apex. Hypopygium finely transversely striated above, with a spine on each side near base, thence rather narrowly produced, gradually narrowed into a sharp, slightly recurved, apical spine. Black; clypeus, mandibles except at apex, the prominence between antennæ, margins of eyes narrowly interrupted at apex, margins of prothorax, anterior margin narrowly interrupted in middle, tegulæ, a spot on mesopleuræ at base of forewing, another very small one behind it, a transverse band near apex of scutellum, a spot on each side at anterior angles, postscutellum, an irregular longitudinal band on middle and a longitudinal band on each side of median segment, a transverse band on the six basal abdominal segments, interrupted in middle and wider beneath than above, coxæ beneath and a line beneath posterior and intermediate femora yellow; tibiæ, tarsi, apex of sixth abdominal segment and seventh segment dull ferruginous. Wings very pale, flavo-hyaline, nervures fuscous. Length 22 mm.

♀. Head convex, sparsely punctured in front, almost smooth on occiput, without any depressed space; eyes oval, oblique, situated at some distance from base of mandibles. Pronotum shining, with a few small, scattered punctures, a row of punctures, each with a long hair on anterior margin, as broad as head, slightly narrowed posteriorly, anterior margin almost straight, posterior margin broadly emarginate. Median segment very

short, obliquely truncate posteriorly, punctured on sides. First abdominal segment vertically truncate anteriorly, with a tuft of long hairs in middle before apex, two transverse carinæ near apex and apical margin recurved forming a third; beneath with a slight truncation at apex. Second segment with about eleven transverse carinæ, excluding the recurved apical margin, carinæ in middle irregular, those at apex the strongest. The remaining segments smooth above, with a few punctures at apex, coarsely punctured beneath, smooth at base; fifth segment beneath longitudinally striated. Pygidium compressed, truncate posteriorly, narrowest just before truncation, transversely striated above, truncation of an oval shape. Black; mandibles at their base, flagellum, fifth abdominal segment beneath, tibiæ and tarsi dark ferruginous; a large subquadrate spot above base of antennæ on each side, a large spot on each side of pronotum joining on middle of anterior margin, leaving posterior margin and sides broadly black, mesothorax except a transverse line at base, a broad transverse band above truncation of first abdominal segment, a spot on each side of second, a narrowly interrupted transverse band in middle of third, a transverse spot on each side of fourth, a triangular spot near apex of first segment beneath and a large spot on each side of the three following segments yellow. Length 19 mm.

Hab.—Mackay, Q. (Turner; ♂♀ in cop.).

160. T. ANCHORITES, n.sp.

♂. Clypeus truncate anteriorly, apical angles slightly produced, pointed at base and connected by a narrow carina with apex of interantennal prominence; head densely and finely punctured, most finely so on front, a short longitudinal sulcus between antennæ. Pronotum about as broad as head, punctured, anterior margin raised. Mesothorax and scutellum densely punctured, scutellum with an ill-defined longitudinal carina, broadly rounded at apex. Median segment oblique, concave at apex, very finely and densely punctured. Abdomen densely and shallowly punctured, first segment rounded and obliquely truncate anteriorly,

with a deep median sulcus on truncation, as wide at apex as second segment. Dorsal plate of apical segment shining in centre, longitudinally striated at sides. Hypopygium triangular, with the basal angles produced into tubercles, transversely rugulose above, with a faint median carina, punctured beneath, apical spine slightly curved. Black; clypeus, mandibles, except at apex, margins of eyes narrowly interrupted at apex, two spots between antennæ, pronotum, except a black spot on posterior margin in middle and sides at posterior angles, a spot on mesopleuræ beneath wing, a large square spot on scutellum, postscutellum, a large spot on median segment with a spot on each side near apical angles, a broad band on each of abdominal segments except seventh, narrowly interrupted in centre except on basal segment, base of first segment beneath, and a large spot on each side of segments 2-5 bright yellow. Wings light flavo-hyaline, nervures black. Length 23 mm.

Hab.—Killalpanima, S.A., 100 miles east of Lake Eyre(H. J. Hillier). Type in Brit. Mus.

161. T. CAMPANULARIS Sm.

Thynnus campanularis Sm., Trans. Ent. Soc. Lond. 1868, p.232, n.2(♂).

♂. Clypeus broadly truncate at apex, irregularly longitudinally striated, pointed at base and connected with interantennal prominence by a short narrow carina. Head and thorax closely and finely punctured, median segment obliquely truncate from postscutellum, surface of truncation slightly concave and delicately rugulose. Abdomen elongate, first segment obliquely truncate anteriorly, concave at base; beneath with an oblique triangular truncation at apex, separated by a shallow groove from second segment. A faintly impressed transverse line near base of second and third segments. Sixth segment with a spine on each side at apical angles beneath; dorsal plate of apical segment narrowly rounded at apex, rugulose at base, longitudinally striated on sides and at apex. Hypopygium with a prominent

spine at base on each side, thence narrowly produced to the apical spine, which is slightly recurved.

Hab.—Sydney(Smith).

162. T. CONFUSUS Sm.

Thynnus confusus Sm., Cat. Hym. B.M. vii. p.13, n.5, 1859(♂).

♂. The whole insect closely punctured; median segment almost vertically truncate from postscutellum. First abdominal segment almost vertically truncate anteriorly; beneath with a small oblique, triangular truncation at apex and a groove between first and second segments. There is no spine at the apical angles of the sixth ventral segment. Dorsal plate of apical segment punctured, broadly rounded at apex. Hypopygium only slightly prominent near basal angles, thence sharply narrowed and very narrowly produced to apical spine.

Hab.—Australia(Smith).

A specimen in the British Museum Collection, which appears to be an immature or discoloured example of this species, is from the Swan River.

I do not regard this species as in any way allied to *T. variabilis* Kirby, as suggested by Smith.

163. T. SULCIFRONS Sm.

Thynnus sulcifrons Sm., Cat. Hym. B.M. vii. p.43, n.119, 1859(♀).

♀. A broad central elevated ridge on head reaching from vertex to clypeus, with a deep excavation on each side reaching nearly to posterior margin, head widened and rounded behind eyes, shining, with a few minute punctures. Pronotum nearly twice as broad as long, sparsely punctured, a row of large punctures along anterior margin, each with a long hair springing from it. Median segment almost smooth. Abdomen smooth with a few scattered punctures; first segment vertically truncate anteriorly, with a transverse carina before apex and apical margin recurved; second segment with about ten transverse carinæ, including the recurved apical margin. Pygidium compressed, truncated pos-

teriorly, very narrow just before truncation, with sides concave and obliquely striated; surface of truncation broader than long, rugose at base, apex smooth, rounded and expanding at sides.

Hab.—Swan River.

This may prove to be the female of *T. confusus* Sm.

164. T. seductor Sm.

Thynnus seductor Sm., Trans. Ent. Soc. Lond. 1868, p. 234, n. 7 (♂).

♂. Clypeus broadly subtruncate anteriorly, apical angles not prominent, punctured-striate. Interantennal prominence deeply emarginate. Pronotum broadly emarginate anteriorly, the angles slightly produced. Median segment obliquely concavo-truncate from postscutellum, with a small tubercle on sides near base, covered with long grey pubescence. First abdominal segment obliquely truncate anteriorly, as broad at apex as second, divided beneath from second by a shallow groove. Sixth segment without a spine at apical angles beneath; dorsal plate of seventh segment very slightly produced, narrowly rounded at apex, rather faintly longitudinally striated. Hypopygium triangularly prominent at basal angles, thence broadly produced and rounded at apex, with a short, curved, apical spine, above obliquely striated, with a longitudinal carina.

♀. Head shining, sparsely punctured, rounded at posterior angles, eyes small and narrow. Thorax and abdomen almost smooth, very sparsely punctured; pronotum nearly as long as broad; median segment almost vertically truncate posteriorly; first abdominal segment vertically truncate anteriorly, transversely striated, apical margin raised. Second abdominal segment with many transverse carinæ, apical carinæ much more prominent than basal. Pygidium obliquely truncate posteriorly, narrow at base and transversely striated between the marginal carinæ which diverge to base of truncation; surface of truncation smooth, broadly oval, with three arched carinæ near base, epipygium reflexed at apex. Fifth segment beneath transversely striated, rugose at base. Head and thorax light ferruginous, abdomen

yellow, all the segments at base and sides and apical margin of second segment black. Legs fuscous. Length 15 mm.

Hab.—Champion Bay, W.A.(Smith; ♂♀ in Brit. Mus.).

The pronotum in the female is broadly emarginate anteriorly, and there is a very slight subtuberculate prominence in the middle of the first abdominal segment above the basal truncation.

165. T. PICTICOLLIS, n.sp.

♀. Head nearly twice as broad as long, very sparsely punctured, a short longitudinal sulcus on front. Pronotum as broad as head, half as broad again as long, very slightly narrowed posteriorly, almost straight on the anterior, broadly emarginate on posterior margin, very finely and closely punctured, a few deep punctures along anterior margin. Mesonotum and median segment sparsely punctured, median segment very short, depressed, vertically truncate posteriorly. Abdomen smooth with a few scattered punctures, first segment truncate anteriorly, with about four irregular transverse carinæ near apex, including the raised apical margin. Second segment broader than first; with about fifteen transverse carinæ, decreasing in elevation from the recurved apical margin to the basal carinæ. Pygidium contracted, smooth at base, vertically truncate posteriorly, strongly contracted and transversely striate just before truncation, surface of truncation oval and finely longitudinally striated, smooth at apex. Beneath the first segment is prominent at the base, with a groove between first and second segments, all the segments shining with sparse punctures, except fifth which is rugose at base in middle, elsewhere coarsely obliquely striated. First joint of anterior tarsi produced on the outside at apex, strongly emarginate at base on inner side with a small tubercle near middle. Black; pronotum except posterior margin ferruginous-red. Length 21 mm.

Hab.—Swan River, W.A. Type in Brit. Mus.

166. T. EXCAVATUS, n.sp.

♂. Clypeus truncate anteriorly, apical angles pointed, punctured, with fine thin pubescence, connected at base by a broad

carina with interantennal prominence, on which there is a very fine longitudinal carina. Head finely rugulose on front, finely punctured on occiput. Thorax finely rugulose, densely punctured on disc of mesonotum, scutellum elevated with a depressed transverse line at base. Median segment obliquely truncate from postscutellum, surface of truncation concave. Abdomen punctured above and beneath, elongate-conical, first segment obliquely truncate anteriorly, concave at base and narrowed, as broad at apex as second, beneath prominent in middle, subtuberculate, with a triangular truncation at apex. Sixth segment with a spine at apical angles beneath. Dorsal plate of apical segment longitudinally striated, rounded at apex; hypopygium transversely striated above, with a spine on each side near base, thence gradually narrowed, terminating in a slightly recurved apical spine. Black; mandibles except at apex, clypeus, two oblique lines between antennæ, margins of eyes interrupted at apex yellow; base of fourth and the whole upper surface of the following abdominal segments flavo-ferruginous. A little thin grey pubescence on head and on sides of median segment. Wings fusco-hyaline at base, hyaline at apex. Length 19-28 mm.

♀. Head smooth on vertex, front and clypeus punctured, clypeus with a very short carina at base; a densely punctured space between the antennæ clothed with fulvous pubescence. Pronotum as broad as head, nearly twice as broad as long, slightly narrowed and broadly emarginate on posterior margin, smooth and shining, with a few scattered punctures, a row of punctures along anterior margin with long fulvous hairs; a large but not deep depression on each side of pronotum, touching anterior margin. Mesonotum and median segment sparsely punctured, median segment short and vertically truncate posteriorly. First abdominal segment vertically truncate anteriorly, pubescent at base, with two transverse carinæ before apex and apical margin recurved. Second segment with about eleven transverse carinæ, including the recurved apical margin, basal carinæ curved to centre, leaving a few interrupted ones at sides near base; the remaining segments sparsely punctured above,

more closely beneath. Fifth segment beneath longitudinally striated. Pygidium truncate posteriorly, slightly narrowed before truncation and transversely striated, surface of truncation smooth, faintly emarginate at apex. Black; depressed marks on pronotum, base of first abdominal segment above truncation, a band interrupted in middle near base of second, a transverse mark on each side on third and a minute spot on each side of fourth yellow. Length 16-25 mm.

Another specimen has the yellow bands on the second and third segments continuous, and almost the whole of the pronotum and mesonotum yellow. A male from Cooktown has the wings darker and flushed with purple.

Hab.—Cairns, Q.(Turner; ♂♀ in cop.); Cooktown(Brown; ♂).

167. T. FENESTRATUS Sm.

Thynnus fenestratus Sm.,Cat.Hym.B.M.vii.p.18, n.27, 1859 (♂).
Thynnus crassipes Sm., *l.c.* p.44, n.123, 1859 (♀).

♂. Clypeus truncate anteriorly, sparsely and coarsely punctured, labrum emarginate at apex, head and thorax finely punctured rugulose; median segment covered with long pubescence, truncate posteriorly, postscutellum not quite reaching base of truncation. First abdominal segment obliquely truncate anteriorly, beneath with a prominent carina from base to apex, a triangular truncation at apex and a groove between first and second segments. Dorsal plate of apical segment longitudinally rugose; a short blunt spine on each side of sixth segment beneath at apical angles. Hypopygium with a projection on each side near basal angle, thence gradually narrowed towards apex, then narrowly produced to base of apical spine.

♀. Head very strongly punctured on front, smooth on vertex, posterior angles only slightly rounded; pronotum of the same breadth as head, nearly as long as broad, broadly emarginate anteriorly, not narrowed posteriorly, smooth with a row of large punctures along anterior margin, each with a hair springing from it. Median punctured, with long hairs, obliquely truncate pos-

teriorly. First abdominal segment vertically truncate anteriorly, with four strong transverse carinæ before apex and apical margin recurved; second segment with seven transverse carinæ, including the recurved apical margin; the remaining segments smooth at base, with large sparse punctures near apex. Fifth segment beneath transversely rugose. Pygidium contracted at base, then obliquely truncate, transversely striate between diverging marginal carinæ to apex of epipygium, hypopygium expanded at apex with membranaceous sides. Black; mandibles, antennæ and legs fuscous. Length 12 mm.

Hab.—Swan River (Smith); Champion Bay, W.A.(Du Boulay).

168. T. MOROSUS Sm.

Thynnus morosus Sm., Descr. n.sp. Hym. p.168, n.28, 1879 (♂).

♂. Clypeus broadly truncate anteriorly, shining, very sparsely punctured. Scutellum raised above mesonotum, with a depressed transverse line at base, broadly subtruncate at apex. First abdominal segment beneath with an oblique triangular truncation at apex, first and second segments separated by a shallow groove, second segment feebly prominent in middle of basal margin beneath. A short spine on each side at apical angle of sixth segment beneath. Hypopygium with a strong spine on each side near base, thence gradually narrowed, thence narrowly produced and slightly widened to base of apical spine, where it is truncate.

Hab.—Champion Bay, W.A.

In fresh specimens the thorax is clothed with long fulvous pubescence; on the median segment and beneath the pubescence is grey.

169. T. FLAVILABRIS Guér.

Thynnus flavilabris Guér., Mag. de Zool. xii. p.8, 1842 (♂); nec *Guérinius flavilabris* Ashm., Canad. Ent. xxxv. 1903(♂).

♂. The first abdominal segment beneath has a small, oblique, triangular truncation at apex. There is no spine at the apical

angles of the sixth ventral segment; the apical segment is rugose, broadly rounded at apex. Hypopygium transversely striated at base above, longitudinally striated near apex, with a blunt spine on each side near base, thence gradually narrowed to base of apical spine where it is narrowly rounded. The palpi are rather longer and much stouter than in typical species of *Thynnus*. Black; clypeus yellow, median segment densely clothed with white pubescence.

Hab.—Sydney, N.S.W. (G. A. Waterhouse).

The female of this large and common Sydney species appears to be still unknown. Ashmead's identification is undoubtedly erroneous. The labrum of *T. flavilabris* is not bilobed, nor are the sides of the hypopygium almost straight.

170. T. PICIPES Westw.

Thynnus picipes Westw., Arc. Ent. ii. 2, p. 114, P. 77, fig. 2, 1844(♂).

Thynnus pubescens Lepel., Hist. Nat. Hym. iii. p. 569, n. 2, 1845(♂).

Thynnus oblongus Sm., Trans. Ent. Soc. London, 1868, p.232, n.3(♂).

Thynnus blasii D.T., Cat. Hym. viii. 103, 1897(♂).

♂. Closely allied to *T. flavilabris* Guér., but the clypeus is much less coarsely punctured, the abdomen finely and closely punctured and clothed with short, thin, white pubescence, and the hypopygium is narrower. The tibiæ and tarsi are dull ferruginous.

Hab.—Albany, W.A. (Westwood); Melbourne(French).

171. T. OBSCURIPENNIS Guér.

Thynnus obscuripennis Guér., Voy. Coq. Zool. ii. 2, p.227, 1830 [1839](♂).

I have not seen this species, which seems to be allied to the shuckardi-group, but is apparently distinct from *T. flaviventris*.

172. T. SHUCKARDI Guér.

Thynnus shuckardi Guér., Mag. de Zool. xii. p.7, P.100, fig.13, 1842 (♂); Westw., Arc. Ent. ii. 2, p.136, ♂♀, P.83, fig.5, ♀, 1844 (♂♀).

The male of this species is very well figured by Guérin. It is a very common species in the neighbourhood of Sydney, and may be distinguished from the allied Victorian *T. guérinii* Westw., by the pubescence on the median segment, which is golden in *T. shuckardi* and white in *T. guérinii*. The breadth of the hypopygium is variable in both species, and I should certainly be inclined to sink Westwood's name were it not that the females received from Mr. French as those of *T. guérinii* show a marked difference in the sculpture of the second abdominal segments, showing about thirteen transverse carinæ instead of about eight, as in *T. shuckardi*. The fifth abdominal segment beneath is transversely rugose in *T. shuckardi*, strongly obliquely rugose-striate in *T. guérinii*. The pygidium seems to be rather narrower in *T. shuckardi*. *T. flaviventris* Guér., is also very near, but always has the two apical abdominal segments black; and the female will probably prove to be distinct.

Hab.—Sydney.

173. T. GUERINII Westw.

Thynnus guérinii Westw., Arc. Ent. ii. 2, p.137, 1844(♂).

The male, as I have stated, seems only to differ from *T. shuckardi* in the colour of the pile on the median segment.

♀. Head shining, front strongly, vertex delicately and sparsely punctured; much broader than long, convex, rounded at posterior angles. Pronotum nearly smooth, half as broad again as long, sides parallel, anterior margin straight, with a row of deep punctures from each of which springs a long hair. Mesonotum and median segment punctured, median segment widened from base to the truncation, vertically truncate posteriorly. First joint of anterior tarsi very broad and strongly emarginate at base on inner margin. First abdominal segment vertically truncate

anteriorly, punctured-rugose, apical margin raised, with a deep transverse groove before apex, which gives the appearance of a second transverse carina when the segment is viewed from behind. Second segment with about thirteen transverse carinæ, those at base much less elevated and more irregular than those at apex. The three following segments smooth at base, with large scattered punctures at apex. Pygidium narrow, contracted before base of posterior truncation, transversely striated between diverging marginal carinæ to near apex of epipygium which is dilated into a curved process on each side; hypopygium rounded and narrowly emarginate in middle at apex, projecting very little beyond epipygium. Fifth segment beneath obliquely rugose-striate. Entirely chestnut-brown. Length 14 mm.

Hab.—Melbourne (French); Albany, W.A.(Westwood).

I see no reason to doubt the correctness of the pairing in this case.

174. T. FLAVIVENTRIS Guér.

Thynnus flaviventris Guér., Voy. Coq. Zool. ii. 2, p.229, 1830 [1839](♂); Guér., Mag. de Zool.xii. p.7,P.101, figs.21-23,1842(♂).

The two apical abdominal segments seem always to be black, and the wings fusco-hyaline. The species varies much in size, Guérin's figure representing an unusually small specimen; most specimens are quite as large as *T. shuckardi*. In Guérin's figure of the hypopygium the basal prominence is not shown, but I have little doubt that this a mistake.

The probable female differs from that of *T. shuckardi*, but as I do not feel much confidence in the correctness of the pairing, I think it best to leave it undescribed.

Hab.—Swan River.

175. T. VARIPES Sm.

Thynnus varipes Sm., Cat. Hym. B.M. vii. 67, 1859(♂).

Thynnus vespoides Sm , Descr. n.sp. Hym. 165, 1879(♂).

Thynnus indistinctus Sm., Descr. n.sp. Hym. 169, 1879(♂).

Thynnus substitutus Schulz, Spolia Hymenopterologica, p.160, 1906 (♂).

Clypeus sparsely punctured; head and thorax rugulose, clothed with dense cinereous pubescence; median segment abruptly truncate from just behind postscutellum, covered with long white pubescence. Abdomen subconical, closely and shallowly punctured; first segment almost vertically truncate anteriorly, with a longitudinal carina beneath from base to apex, where there is a very small vertical triangular truncation. Apical segment coarsely punctured, broadly truncate at apex. Hypopygium with a prominent spine on each side at base, thence more or less gradually narrowed, and produced to base of apical spine; transversely striated above.

Hab.—Adelaide, S.A.; Western Australia (Smith).

The differences between *T. varipes* and *T. vespoides* are confined to the colour on the fifth abdominal segment. In *T. indistinctus* the colour is more obscure, but there does not appear to be any other distinction. Smith merely examined the specimens superficially, and attached far too much importance to colour.

176. T. FLAVOPICTUS Sm.

Thynnus flavopictus Sm., Cat. Hym. B.M. vii. 21, 1859(♂)

♂. Clypeus irregularly longitudinally striated, broadly truncate at apex, the apical angles not produced, pointed at base and connected by a narrow carina with the interantennal prominence, which is emarginate at apex. Head very finely rugulose, with thin fulvous pubescence; thorax finely and closely punctured, scutellum broadly subtruncate at apex. Median segment obliquely truncate from postscutellum, with a short, longitudinal sulcus on each side near apex, minutely punctured. Abdomen elongate, closely punctured above and beneath, first segment oblique at base and narrowed, with a median sulcus not reaching apex, third and fourth segments very slightly broader than the others, apical segment longitudinally striated at apex and rounded, dorsal plate normal, not produced from the base or flattened; first segment beneath with a broad, oblique, triangular truncation at apex and a groove between first and second segments. Sixth segment

without a spine at apical angles. Hypopygium with a spine on each side near base, thence produced in an elongate-triangular form to the apical spine, which is faintly recurved. Smith's description as to colour is sufficient.

♀. Head almost smooth, front between antennæ punctured, with a short median sulcus, strongly rounded to posterior margin. Clypeus broadly emarginate at apex. Thorax punctured, pubescent, pronotum with the anterior margin straight, nearly twice as broad as long, not very strongly narrowed posteriorly. Median segment short, very finely punctured, obliquely truncate posteriorly. Abdomen sparsely punctured, the segments smooth at base, first segment vertically truncate anteriorly, with a low transverse carina before apex; second segment smooth at base, then crossed by four transverse carinæ, the basal one the least prominent, space between apical carina and the slightly recurved apical margin of segment delicately transversely striated. Pygidium smooth at base, then strongly contracted, the middle of the contracted portion elevated, with marginal carinæ, sides concavely depressed and obliquely striated; truncate posteriorly, elongate-oval, the margins raised, epipygium considerably shorter than hypopygium, truncate at apex with a spine projecting at right angles close to base of truncation. Fifth segment beneath smooth at base, coarsely rugose at apex. Black; mandibles, antennæ, legs and apex of epipygium ferruginous; basal half of first four abdominal segments nearly reaching apical margin on sides, a broad band on each side of fifth segment, a spot on each side of second, third and fourth segments beneath and the whole of fifth beneath yellow. Length 14 mm.

Hab.—S.W. Australia(Worsfold; ♂); ♀ in Coll. Brit. Mus.

177. T. FLAVOFASCIATUS Sm.

Thynnus flavofasciatus Sm., Cat. Hym. B.M. vii. 45, 1859(♀).

♀. Head rather small, convex, almost smooth, with a short longitudinal sulcus between antennæ. Thorax and median segment almost smooth, pronotum with a few large punctures

along anterior margin; median segment short, obliquely truncate posteriorly. Abdomen almost smooth, with a few scattered punctures on apical margin of fourth and fifth segments. First segment vertically truncate anteriorly, the apical margin raised, and a less prominent carina just before apex. Second segment with four transverse carinæ at some distance from apex, apical area with two or three indistinct transverse striæ, apical margin very slightly raised. Fifth segment beneath coarsely longitudinally striate-rugose. Pygidium truncate posteriorly, surface of truncation smooth, narrow, elongate-oval; contracted before truncation and marked with a series of carinæ diverging towards apex, narrowly ∧-shaped.

Hab.—Swan River, W.A.(Smith). Allied to *T. flavopictus* Sm.

178. T. AGILIS Sm.

Thynnus agilis Sm., Cat. Hym. B.M. vii. p.20, n.38, 1859(♂).

♂. Clypeus broadly subtruncate anteriorly, sparsely punctured; head and thorax finely rugulose; scutellum punctured. Median segment oblique, rounded at the sides, with thin grey pubescence. Abdomen elongate, shallowly punctured, first segment oblique anteriorly, with a groove between first and second segments beneath; apical segment rugose. Hypopygium prominent near basal angles, subtriangular, with a short apical spine.

Hab.—Swan River, W.A.(Smith); Sydney, N.S.W.(Froggatt).

179. T. ASSIMILIS Sm.

Thynnus assimilis Sm., Cat. Hym. B.M. vii. p.20, n.37,1859(♂).

♂. Clypeus strongly punctured, broadly truncate anteriorly and connected by a narrow carina with interantennal prominence. Head very finely punctured, with a short arched carina above anterior ocellus. Thorax finely punctured, scutellum shining, narrowly truncate at apex. Median segment depressed, oblique, rounded at sides. Abdomen closely and shallowly punctured, first segment oblique at base, with a shallow groove between first and second segments beneath; seventh longitudinally striated

above, rather narrowly truncate at apex. The segments without an impressed transverse line near base. Hypopygium short, with blunt projections near basal angles, thence gradually narrowed, shortly produced, subacute at apex, but without an apical spine.

Hab.—Swan River(Smith).

Smith compares this species with *T. melleus* Westw., giving the chief points of difference, except the absence of an impressed line on the abdominal segments. He says that the hypopygium is truncate at the apex; this is the case in the type, but only through injury.

180. T. FRENCHI, n.sp.

♂. Clypeus produced and broadly truncate anteriorly, convex, shallowly punctured and connected with interantennal prominence by a narrow carina. Head rugulose on front, finely and closely punctured on vertex. Antennæ stout, rather shorter than head and thorax combined. Thorax finely and closely punctured; disc of mesonotum and scutellum more coarsely and sparsely punctured; scutellum subtriangular, rather long, narrowly truncate at apex, prominent, with a depressed transverse line at base. Median segment depressed, rounded at sides, very finely and closely punctured, with thin, short, grey pubescence. Abdomen elongate, rather closely punctured above, finely and very closely punctured beneath; basal segment oblique anteriorly; segments 2-5 with a slightly impressed transverse line near base; epipygium rugose. Hypopygium projecting very little beyond epipygium, showing from above only a short lanceolate spine. Black; mandibles except at apex, clypeus, margins of eyes interrupted on vertex, posterior margin of pronotum, tegulæ, apex of femora, tibiæ above, tarsi, a band narrowly interrupted in middle near apical margin of the six basal abdominal segments, the breadth of the bands occupying about one-third of the length of the segments, and a spot on each side of the same segments beneath yellow. Markings of the abdomen of a very pale colour. Wings flavo-hyaline, nervures fulvous. Length 20 mm.

Hab.—Melbourne(French). Allied to *T. melleus* Westw.

181. T. MELLEUS Westw.

Thynnus (Agriomyia) melleus Westw., Arc. Ent. ii. 2, p.118, P.76, f.g.4, 1844(♂).

Thynnus melleus Sm., Cat. Hym. B.M. vii. p.67, 1859(♀).

♂. Median segment broad and short, rounded at sides. Hypopygium small, often hardly showing beyond epipygium, basal angles prominent, with a blunt tooth, thence sharply narrowed to base of apical spine.

♀. Head broader than long, rounded at posterior angles, shining, minutely and sparsely punctured. Thorax sparsely punctured; pronotum with the anterior margin straight, with a few large setigerous punctures, much broader than long, slightly narrowed posteriorly. Median segment short, obliquely truncate posteriorly. Abdomen very sparsely punctured; first segment with the apical margin depressed, leaving a transverse carina emarginate posteriorly before apex; second segment with three strong transverse carinæ, the space between them and the raised apical margin with a few delicate transverse striæ. The three following segments with a raised curved mark on each side before apex. Pygidium strongly contracted, lanceolate, truncate posteriorly, the surface of the truncation long and very narrow, slightly widened to apex. The colour varies from black to ochraceous.

Hab.—Southern Australia from Champion Bay, W.A.(Du Boulay) to Duaringa, Q (Barnard), ♂♀ in cop.

182. T. INSIDIATOR Sm.

Thynnus insidiator Sm., Descr.n.sp.Hym.p.163,n.15,1879(♂♀).

♂. Clypeus truncate anteriorly, finely and sparsely punctured, narrowly truncate at base and connected rather broadly with the interantennal prominence, on which there is a very delicate longitudinal carina. Head and thorax finely punctured-rugulose; scutellum punctured, broadly subtruncate at apex. Median segment depressed, oblique, the sides strongly inflated, very finely punctured-rugulose, with a median sulcus from base, not reaching apex. Abdomen elongate, rather sparsely punctured, an impressed

transverse line near base of segments 2-5, apical margin of the same segments slightly depressed; apical segment rugose. Hypopygium triangularly prominent near basal angles, thence gradually narrowed to base of the small apical spine. A groove between first and second segments beneath.

♀. Head smooth with a few scattered punctures, slightly broadened anteriorly; mandibles rather blunt, eyes situated near their base, on sides of head. Thorax and median segment sparsely punctured, pronotum half as broad again as long; median segment obliquely truncate posteriorly. Abdomen sparsely punctured, first segment concavo-truncate anteriorly, with a median sulcus on the truncation, the apical margin broadly depressed, a raised curved mark before apex deeply emarginate in middle. Second segment with three transverse carinæ near base, the apical portion showing traces of fine transverse striæ. The remaining segments deeply and rather sparsely punctured, depressed on apical margin. Pygidium lanceolate, oblique and very slightly widened at apex. Fifth segment beneath longitudinally striate.

Hab.—Swan River, W.A.(Smith; ♂♀ in cop.).

183. T. IRRITANS Sm.

Thynnus irritans Sm., Trans. Ent. Soc. London, 1868,p.235(♂).

♂. Clypeus strongly punctured, broadly truncate at apex, very narrowly at base, and connected with interantennal prominence by a broad carina. Head punctured-rugulose, rather small, hardly as broad as pronotum; a sulcus from just below anterior ocellus to between the antennæ. Thorax closely punctured, anterior margin of pronotum straight; scutellum broadly truncate at apex. Median segment short, oblique from postscutellum, then vertically concavo-truncate to apex, delicately punctured-rugulose. Abdomen elongate, closely punctured, first segment oblique, not truncate at apex beneath; a slightly impressed curved line near base of segments 2-4. Hypopygium triangular, short, slightly prominent at basal angles and with a short apical spine.

♀. Head much narrowed posteriorly, narrower than pronotum, flattened on front, antennæ near together at the base, with a

shallow depression on each side between base of antenna and eye. Eyes almost round, situated some distance from base of mandibles. The whole head shining, with minute punctures. Pronotum finely punctured, nearly twice as broad as long; median segment short, obliquely truncate posteriorly, delicately punctured. Abdomen shining, segments smooth at base, punctured at apex; first segment vertically truncate anteriorly, depressed on apical margin, with a curved mark before apex strongly emarginate in middle. Second segment with three transverse carinæ, and the apical margin raised, one or two obscure striæ between third carina and apex. Pygidium oblique, truncate to apex, lanceolate, very narrow, slightly widened to apex, with delicate diverging marginal carinæ before the apical truncation. Fifth segment beneath coarsely longitudinally striated. Entirely castaneous. Length 9 mm.

Hab.—Champion Bay(Du Boulay; ♂); N.W. Coast(♂♀; Brit. Mus.).

184. T. SUBINTERRUPTUS Sm.

Thynnus subinterruptus Sm., Trans. Ent. Soc. Lond. 1868(♂).
Thynnus frater D.T., Cat. Hym. viii. 106, 1897(♂).

♂. Clypeus broadly truncate anteriorly, finely punctured, narrowly truncate at base and connected by a broad carina with the interantennal prominence. Head and thorax finely punctured rugulose, scutellum punctured. Anterior margin of pronotum raised and broadly emarginate. Scutellum rather long, subtriangular. Median segment oblique from just behind postscutellum, rounded at sides, closely punctured, with long grey pubescence. Abdomen smooth, with a few punctures along the apical margins of the segments, and a depressed transverse line, slightly curved in centre near base of segments 2-6. Apical segment rounded, rugose. Hypopygium with a small spine at basal angles, thence broadly produced, subtruncate at apex with a curved apical spine. Otherwise as in Smith's description.

Hab.—Champion Bay, W.A.(Du Boulay).

185. T. BASALIS Sm.

Thynnus basalis Sm., Cat. Hym. B.M. vii. p.23, 1859(♂).
Thynnus vastator Sm., Descr. n.sp. Hym. 158, 1879(♂♀).

♂. Clypeus truncate anteriorly, finely punctured, most sparsely in centre; head and thorax finely punctured-rugulose, a delicate carina from below anterior ocellus ending on the interantennal prominence. Scutellum punctured, median segment finely rugulose, oblique, rounded at sides. Abdomen elongate, the sides nearly straight, a shallow groove between first and second segments beneath, a transverse impressed line near base of segments 2-5 above. Basal angles of hypopygium only slightly prominent.

♀. Head shining, sparsely punctured, convex, subquadrate, rounded at posterior angles. Thorax rather sparsely punctured, with a little thin pubescence; pronotum nearly twice as broad as long, median segment short, obliquely truncate posteriorly. Abdomen sparsely punctured, smooth at base and apex of the segments, first segment broadly depressed along apical margin, leaving a raised, curved mark emarginate in the middle before apex; beneath prominent at base, with an oblique, triangular truncation to apex. Second segment with three transverse carinæ near base, succeeded by five very small transverse carinæ, the apical margin slightly raised. Third and fourth segments with a raised curved mark on each side, interrupted in the middle of the segments. Fifth segment beneath longitudinally striated. Pygidium lanceolate, very narrow, slightly widened towards apex, with a longitudinal carina and the lateral margins raised, forming carinæ.

Hab.—Sydney (Froggatt); Wimmera, Vic. (French); Adelaide (Smith); Swan River (Smith).

Except that typical *T. basalis* is a rather smaller and more slender insect, I fail to find any distinction. I have not seen a female from Western Australia. My descriptions are drawn from the types of *T. vastator*, taken at Adelaide.

186. T. TUBERCULIFRONS Sm.

Thynnus tuberculifrons Sm., Descr. n sp. Hym. p. 161, n. 9, 1879 (♂).

♂. Clypeus truncate anteriorly, apical angles slightly produced, sparsely punctured. The blunt tubercle mentioned by Smith is merely the apex of the usual interantennal carina. Scutellum rather narrowly subtruncate at apex, median segment oblique from a little behind postscutellum, with a short median sulcus from base, and rounded at sides. Hypopygium triangular with a short apical spine and a slight rounded projection on each side at basal angles.

♀. Head subrectangular, slightly rounded at posterior angles, much broader than long, slightly convex, and finely punctured. Thorax sparsely punctured, pronotum about twice as broad as long, raised in middle and longitudinally subcarinate, the anterior margin straight, very little broader than posterior margin, which is broadly and very slightly emarginate. Median segment punctured, short, obliquely truncate posteriorly. First abdominal segment very broadly depressed at apex, with a curved, raised mark on each side above basal truncation. Second segment with three prominent carinæ near base, apical area obscurely transversely striate, apical margin a little raised; third and fourth segments depressed at apex, smooth, with a raised, curved, punctured mark on each side. Pygidium lanceolate, very narrow, slightly widened at apex. Length 11 mm.

Hab.—Swan River, W.A. (Smith; ♂♀ in cop.).

The female from which my description is taken is damaged by gum about the head and on the apex of the abdomen. The male has a superficial resemblance to *T. carbonarius* Sm., but is quite different in the shape of the clypeus and hypopygium. There is no spine on the sixth ventral segment in *T. tuberculifrons*, and no produced dorsal plate on the apical segment.

187. T. ANDREANUS, n.sp.

♂. Clypeus longitudinally punctured-striate, not much produced, broadly truncate anteriorly, the margin very narrowly depressed. Antennæ as long as thorax and median segment

combined. Head broad, very closely and minutely punctured, interantennal prominence rounded at apex, connected with clypeus by a very short, narrow carina. Thorax very finely rugulose, scutellum broadly rounded at apex, median segment obliquely truncate from postscutellum. Abdomen longer than head and thorax, finely and shallowly punctured, broadest at base, first segment almost vertically truncate anteriorly, beneath with a strong median carina, broadly and vertically triangularly truncate at apex, the sixth ventral segment with the apical angles bluntly prominent. Dorsal plate of apical segment produced and longitudinally striated, rounded at apex. Hypopygium with a strong spine on each side near base, thence elongate and gradually narrowed, ending in a long, slight recurved spine. Black; pubescence grey; mandibles, except at apex, clypeus, except a small spot on each side near apical angles, margins of eyes, interrupted on vertex, two small spots between antennæ, margins of pronotum, narrowly interrupted in middle of anterior margin, a small spot on mesopleuræ at base of forewings, apex of scutellum, postscutellum, median segment, a broad band on apical part of abdominal segments, narrowly interrupted in middle above and broadly beneath, epipygium, prosternum, and posterior coxæ beneath orange-yellow. A triangular mark at apex of each abdominal segment dull ferruginous. A narrow, black, transverse line on each side on apical margin of the first five segments. Wings flavo-hyaline, nervures dark fuscous. Length 29 mm.

♀. Head subquadrate, rounded at posterior angles, slightly convex, broader than long, shining, finely and sparsely punctured, almost smooth on vertex, with a delicate longitudinal carina on front. Thorax and median segment smooth and shining, pronotum about half as broad again as long, slightly narrowed to posterior margin, which is broadly emarginate, anterior margin straight. Mesonotum small, broadly rounded posteriorly. Median segment short, strongly widened from base, obliquely truncate posteriorly, much narrower than pronotum. Abdomen smooth and shining, with a few scattered punctures on apical

segments; first segment truncate anteriorly, closely obliquely striate, the striæ diverging from middle to apical margin. Second segment with many transverse carinæ, the two apical carinæ prominent and straight, the other carinæ decreasing in elevation to base, very faint on sides near base, arched to middle and irregular. Abdomen beneath sparsely punctured, third and fourth segments with a smooth, arched, depressed area at apex; fifth segment coarsely longitudinally striated. Pygidium truncate posteriorly, compressed before the truncation and obliquely striate, surface of the truncation ovate, obliquely striate at base, smooth at apex, epipygium recurved at apex. Head ferruginous, with a large yellow mark on front narrowly interrupted in middle. Pronotum yellow, with a triangular mark on middle of anterior margin ferruginous; mesonotum ferruginous, posterior margin broadly yellow; median segment black. Abdomen fuscous; truncation of basal segment black; a broad band on first segment above truncation extending nearly to apical margin, a large spot on each side of second segment, a transverse band on third and fourth segments before apical margin, narrowly interrupted in middle on third and broadly on fourth yellow. Abdomen beneath ferruginous; first segment at apex and a large spot on each side of segments 2-4 yellow. Legs ferruginous. Length 22 mm.

Hab.—New South Wales (Staudinger).

188. T. CARBONARIUS Sm.

Thynnus carbonarius Sm., Cat. Hym. B. M. vii. p. 23, n. 51, 1859(♂).

Thynnus cœlebs Sauss., Reise d. Nov. Zool. ii. 1, Hym. p. 122, n. 10, 1867(♀).

Thynnus clypearis Sauss., Stett. Ent. Zeit. xxx. p. 59, n. 9, 1869, (♂♀).

Rhagigaster clypeatus Sm., Descr. n. sp. Hym. p. 77, n. 5, 1879(♂).

Thynnus hirnii D.T., Cat. Hym. viii. 108, 1897(♂).

Saussure's descriptions are sufficient. He describes the female as belonging to the male *T. clypearis* with some doubt, but he is quite correct. I have compared Smith's types. He places

this species and *T. basalis* in *Thynnoides*, but I do not consider them very near either to each other or to typical *Thynnoides*.

Hab.—Sydney(Froggatt; ♂♀ in cop.); Adelaide(Smith).

189. T. MOECHUS, n.sp.

♂. Clypeus punctured, broadly advanced and subemarginate at apex, the apical angles rather prominent, with an obscure carina from base to apex, the centre convex. Head and thorax very closely and finely punctured, median segment finely rugulose. Pubescence on front of head, vertex and thorax above fulvous, elsewhere grey. Abdomen elongate, basal segment narrow, not as broad at apex as second segment; segments 2-5 shallowly punctured with an impressed transverse line near base; epipygium rugose, truncate at apex. Hypopygium subtriangular narrowly produced at apex, with a short apical spine. Black; tibiæ and tarsi fusco-ferruginous. Wings hyaline tinged with yellow, nervures black. Length 15 mm.

♀. Head small, with a concave depression on each side in front, the depressions smooth and shining, the rest of head finely punctured. Pronotum opaque, sparsely punctured, broadly emarginate anteriorly, half as broad again as long, as broad as head. Median segment shining, very short and narrow, shining, obliquely truncate from just behind mesonotum. Abdomen much broader than thorax, the segments smooth at base, very finely punctured at apex; first segment obliquely striated; second segment with transverse carinæ, the three or four apical carinæ straight, those nearer the base less elevated, arched in middle, oblique and numerous at sides. Pygidium arched at base, oblique posteriorly, long and narrow, a little compressed before the oblique truncation, widening gradually towards apex, longitudinally striated before base of truncation. Entirely fuscous. Length 11 mm.

Hab.—Sydney, N.S.W.(Froggatt; ♂♀ in cop.). Types in Coll. Froggatt.

Allied to *T. novaræ* Sauss. The female closely resembles that of *T. carbonarius* Sm., but the sculpture of the second abdominal segment is different, and the head and thorax are smaller. The

male has no spine on the sixth ventral segment as in *T. novaræ*, and the shape of the clypeus is different.

190. T. NOVARÆ Sauss.

Thynnus novaræ Sauss., Reise d. Nov. Zool. ii. 1, Hym. p.119, n.5, 1867(♂♀).

Thynnus remissus Schulz, Spolia Hymenopterologica, p.161, 1906.

Saussure's description is good. In the two male specimens I have seen, the anterior portion of the clypeus is longitudinally striated, as is also the epipygium. They may possibly be distinct.

Hab.—Sydney, N.S.W.(Saussure).

Saussure compares this species with *Thynnoides fulvipes* Guér., but I think that his identification of *T. fulvipes* is incorrect.

191. T. PSEUSTES, n.sp.

♂. Clypeus delicately longitudinally striate-punctured, prominent at base, then deflexed to apex and broadly truncate. Head, thorax and median segment very finely and closely punctured, head and thorax above with thin fulvous pubescence. Scutellum rather long, with a delicate, longitudinal, median carina. Median segment longer than broad, with a short longitudinal sulcus on each side at apex. Abdomen elongate, finely and closely punctured; segments 2-4 with an impressed transverse line near base. Dorsal plate of apical segment produced, narrow at apex and longitudinally striated. Hypopygium transversely striated above, with a spine on each side near basal angles, thence produced and elongate-triangular, with a minute apical spine. Sixth ventral segment with a spine on each side at apical angles. Black; mandibles and clypeus yellow; legs, except coxæ and trochanters, ferruginous. Wings hyaline tinged with yellow, nervures fusco-ferruginous. Length 14 mm.

♀. Head coarsely and sparsely punctured, subrectangular, rounded at posterior angles, a little broader than long, and slightly convex. Thorax sparsely punctured; pronotum

emarginate posteriorly, broader than long, sides nearly parallel. Median segment short, obliquely truncate posteriorly, closely and minutely punctured. First abdominal segment concave-truncate anteriorly, closely and deeply punctured above the truncation, apical margin strongly raised with a deep transverse groove before it. Second segment with about nine rather irregular transverse carinæ, including the recurved apical margin; the three following segments delicately aciculate at base, very sparsely punctured at apex, apical margin very slightly depressed, with a faintly raised curved mark on each side. Fifth ventral segment coarsely longitudinally striated. Pygidium compressed at base, obliquely truncate and widened posteriorly, longitudinally striated before and at base of the truncation, smooth at apex; epipygium with a rounded lobe on each side near base of the truncation. Entirely light ferruginous. In more mature specimens black, with the mandibles, antennæ and legs fusco-ferruginous. Length 11 mm.

Hab.—Australia(Dämel); Sydney(Froggatt; ♂♀ in cop.).

Types in Oxford University Museum.

192. T. WALKERI, n.sp.

♂. Clypeus large, prominent at base, broadly truncate at apex, longitudinally punctured-striate. Antennæ as long as head and thorax. Head a little broader than pronotum, finely rugulose; thorax very finely punctured-rugulose, punctured on disc of mesonotum and on scutellum; scutellum with an almost obsolete longitudinal carina. Median segment transversely rugulose, obliquely depressed from just behind postscutellum. Abdomen closely and shallowly punctured, short, second segment a little the broadest; first segment oblique, narrowed to base, with a carina from base to apex beneath and a deep groove between first and second segments, second ventral segment subtuberculate at base. Segments 2-4 above with a depressed transverse line near base. Sixth ventral segment with a spine on each side at apical angles. Dorsal plate of epipygium a little produced, punctured at base, longitudinally striated at extreme apex. Hypopygium

with an acute spine on each side near base, thence sharply narrowed and produced with parallel sides to base of the long apical spine, transversely striated above. Opaque black; mandibles, except at apex, clypeus, margin of interantennal prominence, margins of eyes interrupted on vertex, tegulæ and anterior coxæ yellow. Legs fuscous, anterior legs ferruginous. Pubescence on head and disc of thorax short and fulvous, elsewhere grey; a band of grey pubescence on apical margin of abdominal segments. Wings fusco-hyaline, nervures black, stigma fuscous. Length 17 mm.

Hab.—Fremantle, W.A.(Walker). Type in Brit. Mus.

193. T. ATROX, n.sp.

♂. Clypeus very prominent at base, then vertical to apex, where it is very broadly truncated, coarsely longitudinally striated. Antennæ rather longer than thorax and median segment combined. Head and thorax very finely and closely punctured, with thin cinereous pubescence. Median segment short, obliquely truncate from a little behind postscutellum, clothed with long grey pubescence. Abdomen short, very closely and shallowly punctured, first segment not as broad as second, truncate at base, with a median sulcus on the truncation; a deep groove between first and second ventral segments, second segment with a tubercle at base. All the segments above with a band of grey pubescence on apical margin. A spine at apical angles of sixth ventral segment. Dorsal plate of epipygium produced, longitudinally striated, narrowly truncate at apex. Hypopygium prominent at basal angles, thence broad and gradually narrowed to apex where it is broadly rounded, without an apical spine. Entirely black; legs fusco-ferruginous. Wings hyaline faintly tinged with fuscous, nervures black. Length 21 mm.

Hab.—Fremantle, W.A. Type in Oxford University Museum.

Allied to *T. walkeri*, but the clypeus and hypopygium are very different.

194. T. NIGRIPES Guérin.

Thynnoides nigripes Guér., Mag. de Zool. xii. p.10, 1842.

The original description is poor, and I have not seen the type. There is a damaged specimen in the British Museum which may belong to this species, but the hypopygium does not answer to the description, being without an apical spine, which may possibly have been broken. In any case I do not think the species will come at all near typical *Thynnoides*.

Hab.—Swan River(Guérin).

195. T. SIMPLEX Sm.

Thynnus simplex Sm., Descr. n.sp. Hym. p.167, n.26, 1879(♂).

♂. Clypeus very prominent at base. Scutellum long, narrowly truncate at apex; abdomen shining, sparsely and shallowly punctured, first ventral segment with a carina from base, produced at apex into a curved tubercle overhanging the deep groove between first and second segments. Sixth ventral segment with a spine on each side at apical angles. Hypopygium with a blunt prominence near basal angles, thence broadly produced and gradually narrowed, rounded at apex, with a short apical spine; transversely striated above.

Hab.—Champion Bay, W.A.(Du Boulay).

196. T. CRUDELIS, n.sp.

♂. Clypeus rugulose, produced and rather narrowly truncate at apex, prominent at base. Head finely rugose, interantennal prominence broadly truncate at apex, a delicate longitudinal carina from a little below anterior ocellus almost reaching base of clypeus. Thorax finely and very closely punctured; pronotum a little narrower than head, anterior margin straight and slightly raised. Median segment rounded, finely rugulose, with a strong median sulcus from base to apex. Abdomen elongate, very finely and shallowly punctured; segments 2-5 with an impressed transverse line near base and a strongly raised transverse mark on each side just before apical margin above and

beneath. Sixth segment coarsely punctured, with a spine on each side at apical angles beneath; apical segment with the dorsal plate slightly produced, marked with strongly curved striæ. Hypopygium prominent, subtriangular, narrowly truncate at apex, with a short, recurved, apical spine; obliquely striated above, punctured beneath. Black; apical abdominal segment ferruginous-red. Wings hyaline, nervures black, stigma fuscous. Third cubital cell long, receiving the second recurrent nervure near the middle of its lower margin. Length 13 mm.

Hab.—Swan River, W.A. Type in Oxford University Museum.

197. T. NUBILIPENNIS Sm.

Thynnus nubilipennis Sm., Descr. n. sp. Hym. p. 167, n. 24. 1879(♂♀).

♂. Clypeus short and broad, truncate at apex. The whole insect finely punctured, more strongly on abdomen than elsewhere, median segment almost smooth. Abdomen elongate, first segment narrower than second, segments 2-4 depressed at base. Epipygium longitudinally rugose. First ventral segment with an oblique triangular truncation at apex, segments 2-5 subtuberculate near apical angles. Hypopygium with a spine on each side near base, thence gradually narrowed and rounded at base of apical spine.

♀. Head deeply but rather sparsely punctured, with a shallow, smooth depression on each side between base of antennæ and eyes. Pronotum rectangular, much broader than long, finely and closely punctured, with a few large punctures from which spring long hairs along the anterior margin. Median segment and abdomen rather strongly punctured, median segment very short, oblique from just behind mesonotum. First abdominal segment with a transverse carina just before apex, and apical margin slightly raised; second segment with six transverse carinæ, including the raised apical margin. Fifth ventral segment longitudinally rugose-striate; sides of abdomen thinly clothed with long hairs. Pygidium elongate, truncate posteriorly, contracted before apex

and narrow, with a longitudinal carina between raised margins reaching on to surface of truncation, which is elongate, subtriangular, broadened to apex and truncate.

Hab.—Mackay to Cairns (Turner; ♂♀ in cop.).

This will probably prove to be a geographical form of *T. frauenfeldianus* Sauss., from Sydney.

198. T. FRAUENFELDIANUS Sauss.

Thynnus frauenfeldianus Sauss., Reise d. Nov. Zool. ii. 1, Hym. p.120, n.7, 1867.

This is very near *T. nubilipennis* Sm., from which it may be distinguished in the male sex by the finely rugulose head, the lesser development of the yellow markings on the pronotum and abdomen, and the shape of the hypopygium which is hardly at all prominent at the basal angles, elongate-triangular to the apical spine.

Saussure describes the male only. The female is very similar to that of *T. nubilipennis*, but may be distinguished by the broader and much smoother head. The specimen before me does not otherwise differ from *T. nubilipennis*, but is immature as to colour.

Hab.—Sydney.

199. T. MODESTUS Sm.

Thynnus modestus Sm., Cat. Hym. B.M. vii. p.19, n.34, 1859 (♂).

♂. Clypeus broad, strongly convex, not much advanced, broadly truncate at apex, subtruncate at base and connected with the interantennal prominence by a narrow carina. The whole insect closely and finely punctured, punctures on abdomen shallow and larger. Scutellum broad and rather short; median segment depressed, rounded, with a longitudinal sulcus from base to centre, and one on each side from centre to apex. Abdomen elongate-fusiform, first segment beneath with an oblique triangular truncation at apex, and divided by a groove from second segment, segments 2-4 above depressed at base. Hypopygium

with a strong prominence on each side at basal angles, thence narrowed and produced to apical spine.

Hab.—Swan River (Smith).

♀. Head shining, very finely and sparsely punctured, broader than long and broader than thorax, moderately convex, eyes situated at some distance from base of mandibles, a deep depression on each side reaching from eye to base of antenna, front with a deep, longitudinal, median sulcus. Thorax, median segment and abdomen very sparsely punctured; pronotum almost rectangular, half as broad again as long; median segment short and broad, rather abruptly truncate posteriorly. First abdominal segment vertically truncate anteriorly, apical margin slightly raised, with a narrow groove before it; second segment with eight or nine rather irregular transverse carinæ; fifth ventral segment longitudinally striated. Pygidium oblique, vertically truncate posteriorly, a little contracted and longitudinally striated before the truncation, surface of truncation smooth and broadly oval. Head, thorax, median segment and legs ferruginous; abdomen black; a transverse band on first segment above truncation, a spot on each side of second, and an interrupted transverse band on third, fourth and fifth segments yellow. Length 14 mm.

Type ♀, in Oxford University Museum, ex Coll. Saunders.

200. T. CONSTRICTUS Sm.

Thynnus constrictus Sm., Cat. Hym. B.M. vii. p. 19, n. 35, 1859(♂).

♂. Clypeus produced and rather broadly truncate at apex, sparsely and deeply punctured, connected by a narrow carina with the interantennal prominence, which is broadly rounded at apex; front of head punctured-rugose, vertex sparsely punctured. Pronotum short and broad, almost smooth, anterior angles produced; mesonotum and scutellum closely punctured. Median segment broad, rounded at sides, finely rugulose, almost smooth at base. Abdomen fusiform, shallowly and sparsely punctured, the segments constricted at base. Second ventral segment subtuberculate at base. Hypopygium with a tooth on each side

near basal angles, thence produced in an elongate-triangular form to base of the strong apical spine.

Hab.—Swan River (Smith). Nearest to *T. modestus* Sm.

201. T. UNIFASCIATUS Sm.

Thynnus unifasciatus Sm., Brenchley's Cruise of the Curaçoa, 458, P.xliii. f.1, 1873.

♂. Clypeus strongly convex, more narrowly truncate at apex than in most of the species of *Thynnus*, coarsely punctured. Lateral anterior angles of prothorax slightly prominent; anterior margin of pronotum, which is as broad as the head, rather strongly raised at sides. Mesonotum and scutellum shallowly but not very sparsely punctured, scutellum strongly hollowed in middle and towards apex. Median segment oblique, short and transversely striate. The hypopygium has a strong tooth on each side near base, thence narrowed abruptly and produced with parallel sides, subconical at extreme apex, with a faintly recurved apical spine. First abdominal segment longitudinally carinate beneath, the carina produced at apex into a long tubercle overarching the rather deep groove which separates the first and second segments. Wings hyaline, anterior wings fuscous on basal half and along costa. Length 18-23 mm.

Hab.—Mackay, Q.(Turner).

The original description is very poor, but is accompanied by a good figure. The species is very distinct, but is most nearly allied to *T. impetuosus* Sm.

202. T. IMPETUOSUS Sm.

Thynnus impetuosus Sm., Trans. Ent. Soc. Lond.1868,p.233(♂).

♂. Clypeus produced and truncate at apex, apical margin depressed and membranous, the raised portion above the depression strongly emarginate, coarsely punctured-rugose. Head broad, sparsely punctured, anterior ocellus situated in a depression, from which a delicate carina reaches to base of clypeus. Anterior margin of pronotum raised, the lateral angles slightly

prominent, a deep transverse groove behind margin; pronotum almost smooth, mesonotum sparsely punctured. Scutellum rather strongly punctured, with a transverse depressed line at its base, subtriangular rather narrowly truncate at apex, depressed at apex and slightly concave, overlapping postscutellum and reaching base of the median segment, which is abruptly truncate, transversely striated and clothed with white pubescence. Abdomen fusiform, shallowly and finely punctured, first segment beneath with a strong median carina produced at apex into a long tubercle, overhanging the groove between first and second segments. Apical segment above coarsely punctured. Hypopygium with a prominent, acute spine on each side near base, thence narrow and elongate to base of the strong, slightly recurved apical spine. Black; anterior margin of clypeus and margin of interantennal prominence yellow; centre of clypeus and apex of mandibles ferruginous. Abdominal segments with a band of short white pubescence on the apical margins. Wings fusco-hyaline. Length 26 mm.

Hab.—South Australia (Smith, Blackburn).

Smith's description is even more feeble than usual.

203. T. MELANOTUS, n.sp.

♂. Clypeus rather narrowly produced and subtruncate at apex, coarsely punctured, with a carina from base not quite reaching apex. Head shining, sparsely and very finely punctured; interantennal prominence strongly developed, rounded and deeply emarginate anteriorly, with a delicate longitudinal carina. Antennæ as long as abdomen. Thorax shining, sparsely and rather finely punctured; anterior margin of pronotum raised, the angles not prominent; scutellum broadly truncate at apex. Median segment rounded, very finely and closely punctured, with thin grey pubescence. Abdomen shallowly and rather finely punctured; segments 2-4 of about even breadth, with an impressed transverse line near base. Epipygium rugose, truncate at apex. Hypopygium prominent near basal angles, thence narrowed and produced in an elongate-triangular form to base of

apical spine. First ventral segment with a strong longitudinal carina, subtuberculate at apex; second segment with a blunt tubercle at base. Anterior coxæ moderately concave. Entirely black. Wings hyaline, nervures fuscous. Length 18 mm.

Hab.—Swan River. Type in Oxford University Museum.

204. T. BINGHAMI, n.sp.

♂. Clypeus short, a little produced and broadly truncate at apex, finely punctured. Antennæ about as long as thorax and median segment combined. A very delicate carina from below anterior ocellus to apex of interantennal prominence. Head and thorax finely rugulose, scutellum and disc of mesonotum punctured. Median segment transversely rugulose, obliquely truncate from postscutellum. Abdomen closely and very minutely punctured, fusiform; first segment obliquely truncate anteriorly, with a longitudinal sulcus on the truncation; beneath with a carina from base to apex, subtuberculate and with a broadly triangular, vertical truncation at apex. Segments 2-4 above depressed at base, with a slightly raised mark on each side close to apical margin. Epipygium with one or two oblique striæ at apex. Hypopygium with a strong spine on each side near base, thence sharply narrowed and produced to base of the short apical spine. Black; mandibles, except at apex and clypeus yellow; legs ferruginous. Pubescence grey, thickest on sides of head and on median segment. A faint steely lustre on thorax. Wings hyaline, tinged with yellow, nervures fuscous. Length 20 mm.

Hab.—Australia.

205. T. WATERHOUSEI, n.sp.

♂. Clypeus convex, broadly emarginate at apex, closely punctured. Head very finely punctured, a delicate curved carina below anterior ocellus joined by a longitudinal carina which reaches apex of the rounded prominence between antennæ. Thorax finely and closely punctured, more strongly on disc of mesonotum and scutellum; pronotum broadly emarginate

anteriorly, anterior margin raised and produced at lateral angles. Median segment rounded, with a fine longitudinal sulcus from base, finely punctured at base, very finely rugulose before apex, extreme apex smooth. First abdominal segment obliquely concave, truncate anteriorly, segments 2-5 with a strongly impressed transverse line near base, all the segments closely and shallowly punctured above, more finely and sparsely beneath. First segment beneath deeply parted from second at apex, with a strong median carina, produced at apex into a blunt tubercle; second segment with an indistinct median carina. Hypopygium with a prominent tubercle on each side near base, thence narrowly produced, sides almost parallel, conical at apex with a short spine. Black; anterior margin of face and clypeus, narrowly interrupted in centre, and a small spot at base of mandibles on the outer side yellowish-white. Wings fusco-hyaline, nervures black. Length 14-17 mm.

♀. Clypeus transverse, with a very short median carina from base, not reaching apex. Head wider than thorax, broader than long, strongly rounded at posterior angles, convex, shining and very sparsely punctured, a short longitudinal sulcus between antennæ; front round base of antennæ concavely depressed. Pronotum about twice as broad as long, anterior margin straight, finely and sparsely punctured. Mesothorax and median segment sparsely punctured, median segment short and obliquely truncate posteriorly. First abdominal segment strongly punctured, with a transverse carina before apex, apical margin slightly recurved. Second segment with five transverse carinæ, including the recurved apical margin, the carinæ irregular and broken on sides. The remaining segments and all segments beneath smooth at base, punctured at apex; fifth segment beneath coarsely rugose. Pygidium narrow, elongate, about four times as long as wide, rounded at apex, lateral margins subparallel; strongly depressed and almost vertically truncate; a median carina from base of truncation reaching to apex, lateral margins also raised, forming marginal carinæ. At base of truncation are one or two delicate

oblique striæ. Black; spines of tarsi and apex of pygidium fusco-ferruginous. Length 10-12 mm.

Hab.—Woodford, Blue Mts., N.S.W. (G. A. Waterhouse; ♂♀ in cop.).

206. T. ULTIMUS, n.sp.

♂. Clypeus truncate anteriorly, depressed and membranaceous on apical margin, raised portion before apex emarginate in middle, closely punctured. Head very finely rugulose, pubescent, prominence between antennæ rounded at apex, with a faint longitudinal carina from below anterior ocellus. Thorax finely punctured, pronotum short, depressed anteriorly; scutellum prominent, subtriangular, sides almost vertical. Median segment depressed, very finely rugulose and covered with short whitish pubescence. Abdomen fusiform, rather narrow, segments very closely and shallowly punctured, segments 2-5 with an impressed transverse line near base, faint on fourth and fifth segments, and a raised lateral mark near apical margins of second and third segments. First segment beneath carinate from base with a small tubercle at apex and a small triangular truncation below tubercle. Segments beneath slightly depressed at apex, and with a rounded, faintly raised mark on each side near apical margin. Hypopygium elongate, with a small spine on each side near base, thence gradually narrowed to apical spine. Black; clypeus and mandibles except at apex yellow; apex of interantennal prominence, scape and first joint of antennæ beneath and legs dull ferruginous; coxæ black except at apex; posterior margin of pronotum, abdominal segments at apex above and beneath, and at sides, and the whole of the apical segment obscure ferruginous. Wings hyaline, fuscous in the radial cell, nervures fusco-ferruginous at base, black at apex. Length 14 mm.

♀. Head smooth and shining, slightly narrowed anteriorly, front much elevated in centre, obliquely depressed towards posterior and lateral margins, sides slightly concave above base of antennæ. A fine longitudinal sulcus between antennæ. Thorax punctured finely, short, pronotum nearly twice as broad as long, mesonotum not very narrow; median segment short, coarsely

punctured, obliquely truncate posteriorly. First abdominal segment vertically truncate anteriorly, punctured at base, with a broadly emarginate carina before apex; second segment with four transverse carinæ including the recurved apical margin; apical segments punctured, sparsely and finely above, more closely beneath; fifth segment rugose beneath, and emarginate above and beneath. Pygidium narrow, lanceolate, slightly widened and rounded at apex, with a longitudinal median carina and a marginal carina on each side. Dark fuscous; mandibles, except at apex, clypeus, antennæ, legs, second abdominal segment and pygidium fusco-ferruginous. Length 9 mm.

Hab.—Mackay, Q. (Turner; ♂♀ in cop.).

207. T. FULVIPES Guér.

Thynnoides fulvipes Guér., Voy. Coq. Zool. ii. 2, p.233, 1830 [1839](♂); Mag. de Zool. xii. p.10, P.102, figs.15-17, 1842(♂).

?Thynnoides rubripes Guér., Voy. Coq. Zool. ii. 2, p.233, P.8, fig.9, 1830[1839](♂).

Thynnus labiatus Klug, Physik. Abh. Akad. Wiss. Berlin, p.23, n.17, 1840[1842](♂).

Thynnus (*Agriomyia*) *moestus* Sm., Cat. Hym. B.M. vii. p.36, n.93, 1859(♀ nec ♂).

♂. This differs in the sculpture from the closely allied *T. fumipennis* Westw. Head very closely and finely punctured, thorax rather shallowly punctured, abdomen very shallowly and rather sparsely punctured. The hypopygium is narrower, being lanceolate from the basal prominences, not subtriangular as in *T. fumipennis*. The colour of the wings shows considerable variation, but the tegulæ in this species are black. The usual size seems to be from 16-19 mm. Guérin gives 21 mm. for *T. fulvipes*, and 14 mm. for *T. rubripes*; but I have not seen specimens reaching either extreme.

♀. Head shining, sparsely but rather deeply punctured, broader than long, very strongly rounded at posterior angles. Thorax and median segment rather strongly punctured; pronotum short,

nearly twice as broad as long, with a row of long hairs along anterior margin. Median segment rather abruptly truncate posteriorly, surface of truncation almost smooth. First abdominal segment truncate anteriorly, coarsely but sparsely punctured, the apical margin very slightly raised, with a broad, strongly depressed space before it, leaving a transverse carina before the depression with a row of hairs springing from beneath it. Second segment with five transverse carinæ, including the raised apical margin; the remaining segments very sparsely punctured. Pygidium lanceolate, slightly widened at apex, epipygium forming a median carina. Fifth ventral segment coarsely longitudinally rugose. Black; head and legs bright ferruginous; pygidium fusco-ferruginous; mandibles black at apex. Length 11 mm.

Hab.—New South Wales and Victoria. Very common on the Blue Mountains.

The female differs in the colour of the head from *T. fumipennis* which is black, with the exception of the legs and pygidium. The present species is also much more strongly punctured on the head and thorax.

208. T. FUMIPENNIS Westw.

Thynnus (*Thynnoides*) *fumipennis* Westw., Arc. Ent. ii. 2, p. 108, P. 75, figs. 1-2, 1844(♂♀).

♂. Thorax coarsely rugose, abdomen closely and shallowly punctured. Clypeus rather more deeply emarginate at apex than in *T. fulvipes* Guér. Tegulæ ferruginous.

Hab.—Melbourne to Sydney.

209. T. SENILIS Erichs.

Thynnus senilis Erichs., Arch. f. Naturg. viii. 1, p. 263, n. 236, 1842(♂).

♂. This resembles *T. fumipennis* in the sculpture of the abdomen, but the thorax is punctured as in *T. fulvipes*. The legs are black, and the wings hyaline sometimes slightly tinted with yellow.

Hab.—Tasmania (Erichson); Victoria (French).

210. T. PUGIONATUS Guér.

Thynnoides pugionatus Guér., Voy. Coq. ii. 2, p.234, 1830 [1839](♂).

♂. Mesopleuræ red. Otherwise the male is so close to *T. gracilis* Westw., that I am inclined to think they may prove to be identical when long series are studied. Anterior angles of pronotum strongly produced.

♀. The head is a little longer and narrower than in the specimens of *T. gracilis* that I have seen.

Head longer than broad, slightly rounded at posterior angles, sparsely punctured. Pronotum about twice as broad as long, almost smooth, with a row of setigerous punctures along anterior margin; mesonotum not much narrowed. Median segment strongly punctured, obliquely truncate posteriorly. First abdominal segment very coarsely punctured, depressed and almost smooth at apex, leaving a raised transverse carina before apical margin. Second segment with five transverse carinæ, not including the slightly raised apical margin; the remaining segments rather sparsely punctured. Fifth ventral segment rugose. Pygidium lanceolate, raised into a narrow carina at base, the carina branching narrowly towards apex. Dull fusco-ferruginous, the abdomen black. Length 10 mm.

Hab.—Sydney (Froggatt; ♂♀ in cop.).

211. T. GRACILIS Westw.

Thynnus (*Thynnoides*) *gracilis* Westw., Arc. Ent. ii. 2, p 139, P.83, figs.2-3, 1844(♂♀).

Thynnus (*Thynnoides*) *bidens* Sauss., Reise d. Nov. Zool. ii. 1, Hym. p.118, n.3, P.4, fig.68, 1867(♂).

Thynnus viduus Sauss., Reise d. Nov. Zool. ii. 1, Hym. p.123, n.12, P.4, fig.70, 1867(♀).

Thynnus dallatorrei Schulz, Spolia Hymenopterologica, p.160, 1906(♂).

♂. Clypeus long, broadly emarginate at apex. Angles of pronotum very prominent.

Hab.—Adelaide (Westwood); Melbourne (French); Mittagong, N.S.W. (Froggatt).

South Australian specimens seem to be usually much larger than others, but they do not differ otherwise.

212. T. SERVILLEI Lep.

Elaphroptera servillei Lep. St. Farg., Hist. Nat. Ins. Hym. iii. p.571, n.2, P.36, fig.1, 1845(♂).

"Antennes noires. Tête noir, ses poils noirs, mandibules à base rousse, à bout brun. Chaperon roux. Corselet et abdomen d'un gris noir, un peu velus. Pattes d'un testace roussâtre. Ailes un peu enfumées, quoique transparentes, nervures brunes; côte et point marginal roux. Mâle. Long. 5 lignes.

Nouvelle Hollande, Musée de M. Serville."

I am quite unable to identify this species from the description, nor does the figure give much assistance.

213. T. HUMILIS Erichs.

Thynnus humilis Erichs., Arch. f. Naturg. viii. 1, p.264, n.238, 1842(♀).

I have not been able to identify this species, nor does the description enable me to assign it to any of the subgenera.

The following species allied to the typical dentatus-group of *Thynnus* have been described from the Austro-Malayan region.

THYNNUS ATRATUS Sm.

Thynnus atratus Sm., Journ. Proc. Linn. Soc. vi. p. 51, 1861 (♂); Sm., *l.c.* viii. p.77, 1864(♀).

Hab.—Halmaheira.

THYNNUS LUGUBRIS Sm.

Thynnus lugubris Sm., Journ. Linn. Soc. Zool. vii. p. 25, 1863(♂).

Hab.—Ceram. This differs very slightly from *T. atratus*.

THYNNUS ERRATICUS Sm.

Thynnus erraticus Sm., Journ. Proc. Linn. Soc. Zool. iv. Suppl. p.114, 1860(♂).

Hab.—Batchian.

THYNNUS PULLATUS Sm.

Thynnus pullatus Sm., Journ. Linn. Soc. Zool. vii.p.26,1863(♂).

Hab.—Bouru.

THYNNUS PLACIDUS Sm.

Thynnus placidus Sm., Journ. Linn. Soc. Zool.vii.p.26,1863(♂).

Hab.—Waigiou. The species has the median segment exposed.

THYNNUS SERRIGER Sharp.

Thynnus serriger Sharp, Willey, Zool. Results iv. p.388, P.xxxv. fig.13, 1900(♀).

Hab.—New Britain.

THYNNUS OLIVACEUS, n.sp.

♂. Clypeus large, pointed and tumid at base, broadly truncate at apex, punctured, thinly clothed with short pubescence. Head broad, finely punctured, pubescent; front between the antennæ prominent, rounded anteriorly, joined to base of clypeus by a short carina; a faint longitudinal carina on vertex reaching from between posterior ocelli to posterior margin of the head. Thorax finely and shallowly punctured, pronotum nearly as broad as head, anterior margin slightly raised, with a deep transverse groove behind it. Scutellum broadly triangular, produced at apex into a small tubercle. Postscutellum covering base of median segment, which is obliquely truncate, the surface of the truncation almost smooth, with a little short pubescence, longer on sides of segment. Abdomen shining, sparsely punctured, first segment vertically truncate anteriorly, as broad as second, which is broader than the following segments; sixth segment with a spine on each side beneath at apical angles. Hypopygium carinate beneath, broad at base with a strong spine on each side, thence produced shape to apex, a spine on each

side before apex; apical spine acute, curving slightly downwards. Claspers rather narrow, bluntly rounded at apex, and clothed with long fulvous pubescence. Black; clypeus, mandibles, except at apex, two spots narrowly separated between antennæ, margins of eyes, margins of pronotum narrowly, a spot on each side of prothorax above anterior coxæ, tegulæ, a small spot on mesopleuræ beneath base of anterior wing, another larger one above base of intermediate coxæ, apical half of scutellum, postscutellum, truncation of median segment, a spot on each side of first abdominal segment on surface of truncation, apex of segment beneath, a small spot on each side of second, third and fourth segments above, a large spot on each side of the same segments beneath, a small spot on each side of fifth segment beneath and a line on coxæ beneath ochraceous-yellow. Legs, mouth-parts and pubescence ferruginous. Abdomen in some lights of a dark green colour. Wings fusco-hyaline, nervures black. Length 24 mm.

Hab.—German New Guinea. Allied to *T. dentatus*.

The following Austro-Malayan species belong to the subgenus *Aeolothynnus* :—

THYNNUS (AEOLOTHYNNUS) VAGANS Sm.

Thynnus vagans Sm., Journ. Proc. Linn. Soc. Zool. vi. p.51, n.2, 1862(♂); Sm., Proc. Zool. Soc. London, 1877, p.83, n.4(♀).

Hab.—Celebes.

T. (AEOLOTHYNNUS) LAEVISSIMUS Sm.

Thynnus laevissimus Sm., Journ. Proc. Linn. Soc. Zool. viii. p.77, 1864(♀).

Hab.—New Guinea.

T. (AEOLOTHYNNUS) ABDUCTOR Sm.

Thynnus abductor Sm., Journ. Proc. Linn. Soc. Zool. viii. p.78(♂).
Thynnus candidus Sm., Descr. n.sp. Hym. p. 171, 1879(♂).

Hab—Salwatty, New Guinea, Morty.

Genus Iswaroides Ashm., Canad. Ent. xxxv. 1903.

"♂. Hypopygium 5-dentate or with five spines. Clypeus anteriorly not much produced, rounded, without a tooth at the basal lateral angles. Metathorax with a median tooth at apex; abdomen longer than head and thorax united, cylindrical, the sides parallel, the segments constricted at apex, immaculate; maxillary and labial palpi both 4-jointed.

"♀. Pygidium not very narrow, oblong, rounded at apex; basal segment of abdomen without a strongly curved furrow on each side or a strong transverse furrow before the apex. Head seen from above triangular. Eyes small, oval, extending to base of mandibles; clypeus very short, truncate; mandibles falcate, pointed at apex, maxillary palpi 4-jointed, labial palpi 3-jointed; second segment of abdomen with two transverse folds or carinæ towards apex. Type *I. koebelei* Ashm."

I have not seen any species corresponding to these characters. Ashmead does not seem to have published any description of the species.

I have omitted from the list of Australian species two which I am convinced have been described as Australian by mistake, and are almost certainly South American. They both belong to the genus *Scotaena* Klug, of which *Ornepetes* Guér., is in my opinion a synonym.

Scotaena fastuosa Sm.

Thynnus fastuosus Sm., Descr. n.sp. Hymenoptera, p.170, n.34, 1879(♂).

Very near *Thynnus decorus* Sm., from Brazil, which is probably a synonym of *Scotaena trifasciata* Klug, from Bahia.

Hab.—Australia (Smith).

Scotaena flavovariegata Sm.

Thynnus flavovariegatus Sm., Descr. n. sp. Hym. p. 170, n. 33, 1879(♂).

Hab.—Australia (Smith).

Both species were purchased by the British Museum from a dealer many years ago, so that the localities are not on good authority.

I have also omitted *Thynnus gravidus* Westw. (Arc. Ent. ii. 2, p.141, P.82, fig.3, 1844) which, as I mentioned in the first part of this paper, I believe to be the female of *Oncorhinus xanthospilus* Shuck., though without sufficient proof absolutely to sink the name as a synonym.

The following new species have come to hand since the publication of the first part of this paper :—

Tachynomyia imbellis, n.sp.

♂. Clypeus narrowly truncate at apex and deeply punctured. Head coarsely rugose, broadly emarginate posteriorly, cheeks with long grey pubescence. Pronotum short and broad, finely punctured; mesonotum and scutellum rugose, scutellum narrowly truncate at apex. Median segment rounded, strongly and closely punctured. Abdomen subpetiolate, strongly but sparsely punctured; first ventral segment with a longitudinal carina and deeply separated from second segment. Hypopygium truncate at apex, with a strong apical spine. Black; second, third and fourth abdominal segments dark ferruginous. Wings hyaline, with a faint fuscous cloud at apex; nervures black. Length 10 mm.

Hab.—Perth, W.A. Type in British Museum.

Rhytidogaster discrepans, n.sp.

♂. Clypeus subtruncate at apex, finely rugose; with a short median carina from base, abruptly branched before centre and continued as two parallel carinæ to apical margin. Head finely rugose, interantennal carina broadly V-shaped, a short transverse carina below anterior ocellus. Thorax rugose; anterior angles of pronotum prominent; scutellum triangular. Median segment rounded, finely punctured-rugose. Abdomen shining, shallowly punctured, most finely and closely on sides; segments 2-4 with a

strongly depressed transverse line near middle, base of the segments more sparsely and finely punctured. Epipygium narrowly produced and rounded at apex, produced into acute angles at sides before apex; recurved spine of hypopygium only extending a little beyond epipygium. Entirely black. Wings hyaline, nervures fuscous. Length 17 mm.

♀. Head subquadrate, very slightly rounded at posterior angles. The whole insect very deeply and rather sparsely punctured. Pronotum broader than long, slightly narrowed anteriorly. Median segment flattened, widened from base and almost vertically truncate posteriorly. First abdominal segment vertically truncate at base; epipygium with prominent, acute angles at sides before apex, slightly produced in middle and rounded at apex. Hypopygium produced beyond epipygium, rounded at apex and membranous. Black; antennæ, mandibles, a spot on each side between eye and base of antenna, and legs ferruginous. Length 13 mm.

Hab.—Fremantle, W.A.(Walker). Type in British Museum.

The male is nearest to *Rhagigaster obtusus* Sm., which should probably be placed in this genus. The female is without the grooves on the head which are characteristic of *Rhagigaster*; and the maxillary palpi are apparently four-jointed, certainly not six-jointed.

RHYTIDOGASTER PYXIDATUS, n.sp.

♂. Clypeus broadly subtriangular, almost pointed at apex, strongly punctured and without a carina. Antennæ very stout, interantennal carina transverse and almost straight. Head and thorax rugose; median segment more finely rugose, not truncate. Abdomen very closely and shallowly punctured; epipygium rather narrowly produced and truncate at apex, reaching beyond and overarching the curved spine of hypopygium. First ventral segment of abdomen subtuberculate at apex. Black; epipygium ferruginous-red, black at extreme apex. Wings fuscous, nervures black. The division of the first cubital cell is not marked even by a scar. Length 14 mm.

Hab.—Fremantle, W.A.(Walker). Type in British Museum.

This is a very distinct species, and may prove to be generically distinct when the female is discovered.

This Part includes the whole of the remainder of the Australian Thynnidæ at present known. With one or two exceptions, I have refrained from describing females of which the males are unknown, considering that such descriptions would not be in the interests of science. The females are so frequently taken with the males, that the names given to them would soon have to be sunk, whilst the difficulty of certain identification in the Colonies would be much increased.

Where nothing to the contrary is mentioned, the types of the new species are in my own possession, and will be presented to the British Museum.

I exclude from the family the genus *Anthobosca*, which I consider to be more nearly related to *Myzine*.

The South American species of *Thynnidæ*, with the exception of *Aelurus*, seem to belong to different genera from any Australian forms. Two species described as *Tachypterus* by Weijenberg seem to me to be more nearly related to *Scotaena*, and do not belong to the *Diamminæ*.

Cameron* has recently described a new genus, *Adontothynnus*, from S. Africa, but the characters he gives are those of *Anthobosca*. He has been misled by Ashmead, who states that the maxillary palpi are five-jointed in *Anthobosca*, and has not consulted Guérin's description.

* Rec. Albany Museum (S. Africa) i. 1906.

REVISION OF THE AUSTRALIAN SPECIES OF *ADELIUM.*

By H. J. Carter, B.A., F.E.S.

(Plate iii.)

Since 1862 when Blessig wrote his admirably succinct paper* on Australian Heteromera, nothing has been done towards a systematic review of the large genus *Adelium*. Blessig had then fifteen species to consider. Excluding New Zealand and Island species, those described have increased to eighty, of which many are identified in Australian museums. Having collected a large number of these insects myself, and with the material and information kindly supplied by other Australian entomologists, amongst whom I would especially mention Messrs. Lea, Blackburn, Sloane and French, I have ventured to hope that this imperfect monograph will be of some assistance towards a better knowledge of the relation and classification of this genus. The opportunity of a visit to the Museums of Brussels, Paris, and especially to the Natural History Museum of London, has enabled me to further verify my identification of species by a comparison of my collection with types. I take this opportunity of expressing my obligations to Mr. C. O. Waterhouse and Mr. C. J. Gahan for their courtesy and kindly assistance at the last-mentioned Institution.

The Heteromerous insects known under the generic term *Adelium* are widely distributed over Australia. It is probable some of them will be found wherever there is sufficient moisture and soil to produce timber on that Continent. It is doubtful if a true *Adelium* has yet been found outside Australia (including

* Hor. Soc. Ent. Ross.

Tasmania), the so-called *Adelium* from New Zealand and New Caledonia having markedly different characters. So far back as 1866 this was pointed out by Pascoe* when he formed the genus *Pheloneis* for the reception of *A. harpaloides* White; at the same time also he separated *Seirotrana* and *Coripera* from the true *Adelium*. All three of these genera are differentiated from *Adelium* by the character "Elytra prothoraci arcte applicata," while *Pheloneis* has the further distinction in "antennæ articulis apicalibus, ultimo excepto, transversis," and "tarsi antici et intermedii articulis, ultimo excepto, plus minusve latioribus, et triangulariter transversis." Considering therefore that *Seirotrana* and *Coripera* are generally held by entomologists (I consider rightly) as good genera (although the Munich Catalogue made the mistake of confounding *Coripera* with *Pseudhelops*; and the Supplementary Catalogue of Mr. G. C. Champion again merges *Seirotrana* with *Adelium*) it is difficult to understand why Bates should rename *Pheloneis harpaloides* as an *Adelium*† without giving sufficient, or any, reason except that "Adelium is evidently a polymorphous genus."

Even if the genus *Pheloneis* be not accepted, as in my opinion it should be, the New Zealand insects are much nearer *Seirotrana* or *Coripera* than *Adelium*; while one species, *A. aucklandensis* Broun, seems to be very near *Licinoma*. While in New Zealand I captured some ten species of so-called Adelia, and identified them from Captain Broun's excellent Catalogue.

Blessig's memoir has supplied another character which is an additional aid in the separation of Pascoe's genera from *Adelium*, namely in the posterior intercoxal process being "abruptly truncate." In some of the New Zealand insects there is some modification of this, *e.g.*, *A. nigritulum* Broun, and *A. indagator* Broun, have this process moderately truncate (*i.e.*, truncate with slightly rounded angles), but in the narrow epipleuræ, in the position and structure of the coxæ, and in the elytral sculpture

---

* Journ. of Ent. ii. p.483.

† Ann. Mag. Nat. Hist. 1874, Vol. xii. p.32.

these species show some affinity to *Coripera*. The shortness of the antennæ, especially of the third joint, together with their subtriangular form mark a strong departure from the Australian Adelia. It is for New Zealand or British entomologists to decide as to whether the genus *Pheloneis* be finally accepted, but enough has been said to show a strong combination of characters which would prevent the so-called Adelia of New Zealand from inclusion with the true Adelia of Australia. From an examination of the Bates Collection in the British Museum, I would exclude also the New Caledonian Adelia, all of which are expressly described as having "the base [of prothorax] closely applied to the base of the elytra," besides having the prosternal process, mesosternum, and trisinuate base of prothorax quite different from any Australian *Adelium*. For the New Caledonian insects I would therefore suggest the name *Neoadelium* as applicable to *A. nigro-æneum* Bates, *A. fairmairei* Bates, *A. marginatum* Bates, and *A. externocostatum* Bates, *A. caledonicum* (Auct.?), *A. pustulosum* Fauv.,(the last two unrecorded in the Munich Cat.; and the last nom. præocc.).

Stridulation.—A character hitherto unrecorded in *Adelium* is their power of stridulation. Mr. Sharp in the Cambridge Natural History (Part ii. p.264) records that in *Praogena* the under surface of the head has the gular region striate for this purpose, and adds "This is the only case in all the Tenebrionidæ in which any sound-producing organ has been discovered." In the common Sydney species *A. calosomoides* (or *geniale*?) a stridulation is very marked. Mr. C. J. Gahan, an authority on this subject as his excellent paper* shows, dissected several specimens of Adelia in my presence, and showed the stridulating organs to be oblique files or raised ridges near the apex of the upper surface of the abdomen. These were present in the following species:—*A. geniale* (or *calosomoides*), *A. auratum*, *A. plicigerum* and *A. licinoides*, but were absent from *A. porcatum* and *A. striatum*. I have noticed a similar, or even louder, stridulation when taking

* Trans. Ent. Soc. Lond. 1900, p.433.

Apasis howitti Pasc., on Mount Macedon, and *A. puncticeps* Lea, on Mount Kosciusko, forms closely allied to *Adelium*.

Variation.—I have below referred to varieties in the species *A. calosomoides* Kirby. The same remarks apply to other species which have a wide range, as *A. brevicorne*, *A. porcatum*, *A. plicigerum*, *A. auratum*. In such cases a distinct species is to be considered as one which shows a more or less constant combination of characters, each of which may be subject to some variation. On the other hand, where two species described as different show only one or even two variations, I have considered them as local varieties. Thus I consider *A. virescens* Boisd. = *A. brevicorne* Blessig = *A. neophyta* Pasc., to be extraordinarily variable in colour and size; and I have specimens from the north of New South Wales, Victoria and South Australia which vary in colour from bronze to nearly black (Blessig especially mentions a black variety known as *A. sphaeroides*), and in size from 8·5 × 3·5 to 11 × 5 mm. *A. plicigerum* Pasc., only differs from *A. rugosicolle* Macl., in having its pronotum less coarsely rugose, and very slightly in colour. Another difficult and unsatisfactory character for differentiation of species is the foliation of the prothorax. In Adelia generally where such foliation exists it is rarely separated from the disc by a distinct division as in Cardiothorax, and frequently the sculpture of the discal lobes is continued without break to the sides. In common species like *A. calosomoides* a dozen specimens captured together will present every variation of this character, from widely explanate border to a specimen which shows very slight foliation.

The most reliable characters appear to be —(1) The form and length of antennæ, especially that of the third joint; (2) form and sculpture of prothorax and elytra; (3) what Blessig describes as the "intercoxal process," a disc forming the anterior portion of the first abdominal segment between the posterior coxæ. Other determining factors are size, colour, clothing, form of tibiæ, tarsi, epipleuræ, eyes and oral organs.

Sexual variations.—The following, though by no means constant, are the normal variations in the sexes:—(1) Male narrower

U. OF ILL. LIB.

and generally smaller than female. (2) Male with tarsi, especially anterior tarsi, more dilate. (3) Antennæ of male proportionally longer than in female.

History.—Kirby, in 1817, founded the genus *Adelium* for the reception of three insects, *A. calosomoides*, *A. licinoides* and *A. caraboides*, of which the last had already been described as *Calosoma porcatum* by Fabricius in 1774. As to *A. calosomoides*, I shall refer to this species later. *A. licinoides* = *A. cisteloides* Erichs., according to Champion.* This species has a wide range in Victoria and Tasmania.

In 1835, Boisduval (Voyage de l'Astrolabe) added six species, *A. abbreviatum*, *A. harpaloides*, *A. helopioides*, *A. punctipenne*, *A. rugicolle* and *A. virescens*.

A. abbreviatum Boisd. = *A. impressum* Blanch., is a common Tasmanian insect, whose identity has been preserved by Blessig.

A. harpaloides Boisd.—Two specimens marked "Coll. Dejean" are in the Bates Coll. in the British Museum, and exactly correspond to *A. calosomoides* Kirby, except in being smaller. This species must not be confounded with *A. harpaloides* White, from New Zealand = *Pheloneis harpaloides* Pasc. = *A. amaroides* Bates.†

A. helopioides Boisd. = *A. licinoides* Kirby, in the opinion of Pascoe.

A. virescens Boisd.—In the British Museum a number of specimens labelled *A. virescens* are placed as synonymous with *A. brevicorne* Blessig, and *A. neophyta* Pasc. I saw the same species marked *A. virescens* Boisd., in the Brussels Museum.

A. punctipenne and *A. rugicolle* Boisd., are quite unknown to me, and as with all Boisduval's descriptions, they are entirely inadequate for identification, especially in the absence of measurements and localities of capture.

Castelnau added one species, *A. angulicolle*, which has a wide range in New South Wales and Victoria. I have specimens from Wagga, N.S.W., and near Melbourne, Vic. Though I

---

* Trans. Ent. Soc. Lond. 1894.

† Ann. Mag. Nat. Hist. Ser.4, Vol.xii. p.32.

have not seen the type, it is the most easily recognised of all the genus, and is well known in all collections, besides being figured by Blessig.

In 1842, Erichson described *A. elongatum*, *A. tenebrioides* and *A. cisteloides.*

A. elongatum Erichs.—If my identification be correct—and my specimens (taken at Launceston, Tas.) agree with those named as above in the Macleay Museum—this should be referred to *Seirotrana* as the description of Erichson certainly warrants.

A. tenebrioides Erichs.—No authoritatively named specimens are to be found in the Sydney museums. The specimens labelled *A. tenebrioides* in the Macleay Museum are certainly wrongly identified.* In the British Museum I found one specimen labelled "Compared with type by Dr. Haag," which exactly corresponds with specimens I have seen from the Dandenong Ranges, Vic., and from King Island, Tas. It differs from *A. similatum* Germ., in its narrow prothorax, and more elongate depressed form.

A. cisteloides Erichs. = *A. licinoides* Kirby, *fide* Champion.†

In 1845 Blanchard described *A. carinatum* and *A. impressum*, of which the latter is identical with *A. abbreviatum* Boisd.,‡ while the former is a mystery of the past, whose identity I have been able to trace only by the following note:—"M. Blanchard (Hist. Nat. d, Ins. ii. p.35) a fondé en peu de mots un genre Tropidopterus, qu'il place à la suite des Adelium, et auquel il donne pour type une espèce de l'Australie, soi-disant décrite par M. Boisduval, sous le nom de carinatus. Mais il n'existe dans la 'Faune de l'Océanie' de cet auteur, qu'un seul insecte qui porte ce nom, et c'est un Curculionide du genre Amycterus" (Lacordaire, Gen. Col. v).

In 1848 Germar described *A. similatum*; and, in 1861, Blessig described *A. brevicorne* in his able monograph on the genus.

---

* Since rectified [June 9th].

† Trans. Ent. Soc. Lond. 1894.

‡ Blessig, Hor. Soc. Ent. Ross. 1862.

While *A. simulatum* was originally described from Adelaide, it is also a common Victorian species. I have specimens from Adelaide, Gisborne, and Mallee District, Vic., (see also Blackburn, Proc. Linn. Soc. N. S. Wales, 1891, p.535).

A. brevicorne Blessig = *A. neophyta* Pasc. = *A. virescens* Boisd.? (*fide* Champion, Trans. Ent. Soc. Lond. 1894, p.404).

Mr. Champion has pointed out the synonymy of *A. neophyta* with *A. brevicorne* Blessig. I have given above the evidence for considering *A. virescens* Boisd., as identical with these. If this synonymy should stand, it would give *A. virescens* precedence. I consider that for the present the name *A. brevicorne* should remain, since of *A. virescens* it may be said that the name is misleading, the description futile, and the identity uncertain.

In 1866 Pascoe described eight species, viz., *A. augurale*, *A. auratum*, *A. congestum*, *A. latum*, *A. obesum*, *A. striatum*, *A. succisum* and *A. vicarium*, which he continued in 1869 with the fourteen species *A. aerarium*, *A. ancilla*, *A. commodum*, *A. geniale*, *A. neophyta*, *A. orphana*, *A. pilosum*, *A. plicigerum*, *A. reductum*, *A. repandum*, *A. ruptum*, *A. scutellare*, *A. scytalicum* and *A. steropoides*; and, in 1870, *A. geminatum*. Of these I have examined the types and note the following facts.

A. augurale Pasc., though closely allied to *A. porcatum*, Fabr., differs from that species in its brighter metallic green colour, and in having *all* its raised intervals on the elytra interrupted; in *A. porcatum* there is generally one or more interval nearest the suture uninterrupted. I have taken this species in quantity near Glen Innes, N. S. W.

A. auratum Pasc.—In the British Museum and in many Australian Collections (Macleay and Australian Museums; Mr. Simson's Coll.) are specimens labelled *A. fossulatum* Dupont, which are evidently identical with *A. auratum* Pasc. The name seems to have come from Macleay himself, possibly as an MS. name, but I can nowhere find any description under the name *A. fossulatum*; nor is it included in the Munich Catalogue. This fine species is found in the North Coast region of New South

Wales, and extends at least to Rockhampton, from both of which districts I have specimens.

A. congestum Pasc. = *Seirotrana parallela* Germ., and will be more fully referred to in my notes on *Seirotrana*.

A. latum Pasc.—This appears to me to be only a variety of *A. abbreviatum*, though possessing certain distinctive characters of doubtful specific value (see Champion's note, Trans Ent. Soc. Lond. 1894, p.402). I have two specimens labelled Melbourne. Mr. Champion's specimens were taken by Mr. J. J. Walker at Launceston, Tas. Pascoe's locality was Victoria.

A. obesum Pasc.—Though closely allied to *A. similatum* Germ., the differences are well marked. It is in general larger, more robust, more convex, with the prothorax much more widely rounded at the sides, with a corresponding constriction at the base, than Germar's species. The foliation at the sides is also much more explanate, the sculpture of the pronotum is less rugose, and the elytral intervals more convex, while the punctures in the striæ are more regular. I have several specimens from the Preston Reservoir, Melbourne.

A. striatum Pasc. = *A. viridipenne* Macl.—The largest Australian species and well known in all collections. The tropical form has a greenish tint, hence Macleay's species, but there is no other perceptible difference between them. I have black specimens from Mackay, Q.; also a cotype of Macleay's *viridipenne*, with a specimen that is intermediate in colour between them. These vary in size from 19 to 25 mm. long. There is a large striate form close to *A. striatum* in the Bates Coll., marked with an MS. name of Bates' from the mountains of Tasmania, but this is possibly a mistake of locality.

A. vicarium Pasc., is the common form to be found near Perth, W.A.

A. aerarium Pasc.—The only specimen I have seen of this is the type (unique). It is very close to *A. angurale* Pasc., but is of a brighter green colour, is smoother, and has more parallel sides to the prothorax.

A. ancilla Pasc., is a near ally of *A. nitidum* Carter, from which it differs in its more distinct hind angles to the prothorax *inter alia*. This and the preceding species are labelled Darling Downs, Q., but I have never seen them in nature.

A. commodum Pasc.—A common Tasmanian insect, very Licinoma-like from its narrow and nearly smooth prothorax, scarcely emarginate at the apex. It is in most collections.

A. succisum Pasc., is a synonym of *A. angulicolle* Castel., *fide* Pascoe (Ann. Mag. Nat. Hist. 1869, p.132).

A. geniale Pasc.—I have long been in doubt as to its distinction from *A. calosomoides*. This doubt has been intensified by an examination of the respective types. In Pascoe's notes following the brief description he says *A. geniale* is distinguished from *A. calosomoides* by having elytra *striated* with the same broad outline. I had some trouble in finding Kirby's type in the British Museum, but Mr. Gahan kindly unearthed it from the "Century of Insects Coll." in a separate place, and I was astonished to find that it is *distinctly striated*, and that no specimen marked *geniale* or *calosomoides* in the British Museum or in my own long series had more marked striations. The figure given by Kirby, and presumably copied by Blessig, is thus misleading, as presenting smooth, unstriate elytra. It would appear that Pascoe had not examined Kirby's type when he wrote the above. The pronotum of Kirby's type is also more rugose than any specimens marked *geniale* or *calosomoides* that I could find. In such polymorphous insects as Tenebrionidæ it is unwise to dogmatise, but the evidence is strongly in favour of considering the above two species as merely variations of a very polymorphic species of wide range. The variations consist of (1) great diversity of size, especially in width, and in relation to sex; (2) colour-variation from shining bronze to a discolorous form in which the prothorax is green or green-bronze; (3) variation in the rugosity of pronotum; (4) elytral sculpture from being nearly smooth, *i.e.*, with intervals not raised, to marked striation in which the intervals are subconvex. (In the latter case somewhat raised lines appear towards the apex). It is possible that the greater rugosity of pronotum, and marked

striation of the elytra in this type-specimen of *A. calosomoides* is due to a long immersion in spirits. Mr. Sloane has informed me that Carabidæ that have been long immersed in spirits have had their sculpture so much intensified as to cause frequent mistakes of identification.

A. neophyta is a synonym of *A. brevicorne* Blessig, according to Champion,* an opinion with which I concur. It has the widest range of any *Adelium* that I know. I have taken it in the North-East of New South Wales, Sydney, Victoria, while I have specimens from Adelaide, the locality of Blessig's type. As with all common insects of wide range, it varies greatly in size and colour, the general colour a dark shining bronze varying to black. Blessig specially mentions a black variety known to collectors as *A. sphaeroides.*

A. orphana Pasc.—The type of this is a unique specimen I have never seen elsewhere. It is even narrower and more parallel than *A. commodum.* Yankee Jim Creek, Vic.

A. pilosum Pasc.—I have one specimen from Victoria that corresponds with the type. It is a near ally of *A. scutellare* Pasc., but has its sides of prothorax roundly angulate, which in combination with its pilose clothing and split intercoxal process should separate it from its congeners.

A. plicigerum Pasc. = *A. rugosicolle* Macl. (var.).—My specimens of *A. plicigerum* from Mackay, Q., correspond very well with the type from Queensland. My specimens of *A. rugosicolle* are cotypes kindly given me by Mr. Masters. They only differ slightly in size, and in the greater rugosity of the pronotum of *A. rugosicolle.* The latter is worth noting as a geographical variety. Both differ from *A. auratum* Pasc., in having the prothorax rugose; in *A. auratum* it is smooth; while from *A. lindense* Blackb., it is distinguished by its thinner edge to pronotum *inter alia.*

A. reductum Pasc., a small coppery insect allied to *A. calosomoides* Kirby. I have specimens from Gosford, Wyong, N.S.W.; and Brisbane which correspond to the type.

---

* Trans. Ent. Soc. Lond. 1894.

A. repandum Pasc. = *Seirotrana repanda*, and will be dealt with under *Seirotrana* later.

A. ruptum Pasc.—I have one specimen from Queensland (I believe from Mackay) which exactly corresponds with Pascoe's type from Victoria. Here again it is possible that some mistake of locality has occurred. This and *A. steropoides* differ from all other Adelia known to me in their resemblance to *Apasis*, but they are easily distinguished, *inter se*, by the marked difference in their external sculpture, the striæ being uninterrupted in *A. steropoides*, but broken and somewhat reticulate in *A. ruptum*.

A. scutellare Pasc.—My specimens from Mudgee and Inverell, N S.W., correspond with the type from Darling Downs, Q., a neighbouring locality. Pascoe only notes the pilose clothing on the legs, whereas in fresh specimens the whole upper surface is clothed with hair, so that it closely resembles *A. pilosum* Pasc., but its sides are less angulate, and the sculpture of the pronotum is different.

A. scytalicum Pasc., from West Australia, is readily identified by its smooth pronotum and bicolorous form. A small specimen marked with an MS. name of Bates', from Fremantle, in the Bates Coll., is probably a male of this species, while a larger form from Champion Bay in the same collection, also labelled with an MS. name of Bates', seems to me to be only a variety of *A. scytalicum*.

A. steropoides Pasc.—I have one specimen given to me by Mr. T. G. Sloane, locality uncertain, which exactly corresponds to Pascoe's type from Victoria (see note above on *A. ruptum*).

A. geminatum Pasc. = *A. punctum* Carter.—An examination of the types of these has proved this synonomy. It also proves the fairly wide range of this insect, my specimens coming from Grafton, Bellinger, and the Clarence, N.S.W., whereas *A. geminatum* is described from Wide Bay, Q. Its combination of small size, square form and very distinct sculpture should distinguish it from others.

A. geniculatum Haag-Rut. = *Seirotrana geniculata* Haag-Rut. This will be more fully dealt with under *Seirotrana*.

Macleay has since added *A. convexiusculum*, *A. monilicorne*, *A. panageicolle*, *A. parvulum*, *A. rugicolle* and *A. viridipenne*, described in his 'Insects from Gayndah.'

A. convexiusculum Macl.—I have two cotypes of this species kindly given me by Mr. Masters; a small species of the *A. calosomoides* type, with obsolete hind angles to prothorax, from Gayndah, Q.

A. monilicorne Macl., differs manifestly in the structure of its antennæ, the shape of its eyes, which are nearly round, as seen from above, though not prominent, and in its sculpture, from all Adelia known to me. It would seem to me to be nearer *Brycopia* than *Adelium*. There are specimens in the Macleay and Australian Museums, of which the latter probably contains the type, but as is usual with Macleay's types, unmarked as such.

A. panageicolle Macl.—Mr. Masters has generously given me two specimens of this interesting little species, which may have to stand for a type of another genus, from its moniliform antennæ, pilose tarsi, and sculpture and shape of prothorax. The pilose tarsi, however, would place it under *Dystalica*, to which it has the nearest affinity.

A. parvulum Macl.—Specimens in the Macleay and Australian Museums. From its rounded eyes it should be referred to *Brycopia*, though in this respect the character shows some modification.

A. rugosicolle and *A. viridipenne* Macl., have already been noticed above.

Mr. Blackburn has described eleven species, viz, *A. æquale*, *A. alpicola*, *A. angulatum*, *A. ellipticum*, *A. inconspicuum*, *A. lindense*, *A. occidentale*, *A. pustulosum*, *A. simplex*, *A. tropicum* and *A. victoriæ*. Through the courtesy of Mr. Blackburn I have been able to examine the types of all except *A. æquale*, *A. simplex* and *A victoriæ*, while Mr. C. French has kindly lent me the type of *A. victoriæ*.

A. alpicola Blackb., occurs on Mount Kosciusko, where I have taken it myself, as well as on the Victorian Alps, of which Kosciusko is really a portion It is certainly of the *A. calosomoides*

type, but considerably larger, and that so consistently that, even if it be considered as a variety of that species, it deserves a special name. I have taken a species very much like it in the Blue Mountains, also under Eucalyptus bark, which I have always considered as a variety of *A. geniale* or *A. calosomoides*, but the antennæ and tarsi are not rufous as *A. alpicola* is characterised; but this is the only definite character, except size, by which I can differentiate *A. alpicola* from *A. calosomoides*.

A. angulatum Blackb.—Mr. Blackburn has kindly given me one specimen as a cotype. It is extremely close to *A. angulicolle* of Castelnau, but differs in its thicker edge to pronotum, its wider explanate margin, especially near the anterior angles, which are much more prominent and reflexed than in Castelnau's species. The puncturation of the pronotum and elytra is also more regular and even, and the intercoxal process is without a carinulate edge.

A. ellipticum Blackb.—I have also a cotype of this species from its author. It is a common species in the Richmond and Clarence River district, easily identified by its brilliant colour and smooth elytra.

A. inconspicuum Blackb., a small species from Kangaroo Island, very close to *A. brevicorne* Blessig, but smaller and more coarsely punctured.

A. lindense Blackb.—I took several specimens of this at Mount Barker, W.A., which do not materially differ from the South Australian specimens I have. While approaching *A. auratum* in size and elytral sculpture, its pronotum is more wrinkled, and its form generally narrower than Pascoe's species.

A. occidentale Blackb., from West Australia, is a fine species strongly differentiated from all others by its large and projecting eyes, punctulate but glabrous pronotum, posterior angles acute and projecting outwards, its regularly striate-punctate elytra and its shining black colour.

A. pustulosum Blackb.—Until I was able to examine the type of *A. victoriæ* Blackb., the descriptions of these species led me into much uncertainty as to their identification. Having

examined the types of both species, this doubt has been removed. The combination of differences pointed out in the diagnosis* are sufficient to distinguish these otherwise closely similar forms. The type of *A. victoriæ* is apparently male, much mutilated, having only five joints left of one antennæ, the other having disappeared, together with the anterior tarsi and one posterior leg. I have six specimens which I consider identical with *A. victoriæ* from Illawarra, N. S.W. (Bulli and Nowra); and eight specimens which I consider identical with *A. pustulosum* from Gisborne and Bullarook Forest, Vic., and Lambing Flat, N.S.W., while specimens from Mittagong, Gunning, and Forest Reef are intermediate forms, having the wider, more explanate and more coarsely sculptured prothorax of *A. pustulosum* with the widely obtuse hind angle of *A. victoriæ*. As these last appear to be all female, in the absence of any description of the female, I conclude that they are probably sexual variations of *A. victoriæ*.

Champion in 1894 described two species, *A. tasmanicum* and *A. nodulosum*,† whose types I have seen, and whose excellent diagnosis leaves little room for comment.

Lea next added four, *A. capitatum*, *A. heterodoxum*, *A. regulare*, and *A. minutum*,‡ and through Mr. Lea's courtesy I have been able to examine his types.

A. capitatum Lea, is a very distinct form, which I have from Wee Waa, N. S.W., and is apparently widely distributed in the western district of this State.

A. heterodoxum Lea, is also very distinct, though its chief distinction comes from a character omitted in the original description, in that it is clothed throughout, even to the legs, with upright brown pile. While in general form and in the length of the third antennal joint it is similar to *A. tenebrioides* Erichs., it differs from that species in being strongly pilose, and in having its elytral intervals uninterrupted. The third antennal joint is not,

---

* These Proceedings, 1891, p.534.

† Trans. Ent. Soc. Lond. Part ii. p.403.

‡ These Proceedings, 1898.

however, quite so long as Mr. Lea's description warrants; when measured by an enlarged tracing it is about equal to the combined fourth and fifth, and less than half the sixth joints.

A. regulare Lea, while approaching *A. brevicorne* Blessig, is, I think, a good species, from its constant parallel form; but so far as colour goes, Blessig records his species as varying from metallic green to black.

A. minutum Lea = *Brycopia minuta* Lea, a fact noted by me.*

To the above I added five species in 1905, and three more in 1906,† *A. helmsi*, *A. reticulatum*, *A. violaceum*, *A. minor*, *A. globulosum*, *A. cœruleum*, *A. nitidum* and *A. punctum*.

A. helmsi Carter, is the same species as that labelled with an MS. name in the Hope Coll.; as also in the Bates Coll. of the British Museum. The original specimens came from the Macleay River, but I have since taken it at Bulladelah, near Port Stephens. It has been long in the Macleay Museum unnamed.

A. reticulatum Carter.—I took the type-specimens at Kurrajong, but have since met with it on Mount Irvine, Blue Mountains.

A. minor and *A. globulosum* have already been referred to *Brycopia* by me.‡ Mr. Ferguson has taken *B. globulosa* lately at North Sydney near Middle Harbour; and I have taken it at Waterfall, N. S.W.

A. punctum Carter, has been shown to be synonymous with *A. geminatum* Pasc.

To these I append below the descriptions of seven more—*A. barbatum*, *A. hackeri*, *A. canaliculatum*, *A. pestiferum*, *A. bicolor*, *A. subdepressum* and *A. rotundum*.

In the Bates Coll. I also noted the following species :—

A specimen labelled with an MS. name of Bates', is probably *A. victoriæ* Blackb., or *A. pustulosum* Blackb., but at the time I was in doubt as to the exact points of difference between these species.

A specimen bearing an MS. name of Bates' is probably *A. lindense* Blackb.

---

* These Proceedings, 1905, p.181.
† These Proceedings, 1905, p.181; and 1906, p.259.
‡ These Proceedings, 1906, p.259.

To sum up, we have eighty described species. Of these, *three* are unknown to me—*A. punctipenne* Boisd., *A. rugicolle* Boisd., and *A. carinatum* Blanch.

Ten have been referred to other genera, as follows:—*A. parallelum* Germ., *A. geniculatum* Haag-Rut., *A. congestum* Pasc., *A. repandum* Pasc., to *Seirotrana*; *A. monilicorne* Macl., *A. parvulum* Macl., *A. minutum* Lea, *A. globulosum* Carter, *A. minor* Carter, to *Brycopia*; and *A. panageicolle* Macl., to *Dystalica*.

And the following are considered as synonyms or varieties:—
A. porcatum Fabr. = *A. caraboides* Kirby.
A. licinoides Kirby = *A. cisteloides* Erichs. = *A. helopioides* Boisd.
A. calosomoides Kirby = *A. geniale* Pasc.(?) = *A. harpaloides* Boisd.
A. abbreviatum Boisd. = *A. impressum* Blanch. = *A. latum* Pasc.(var.)
A. virescens Boisd.(?) = *A. brevicorne* Blessig = *A. neophyta* Pasc.
A. angulicolle Casteln = *A. succisum* Pasc.
A. plicigerum Pasc. = *A. rugosicolle* Macl.(var.).
A. striatum Pasc. = *A. viridipenne* Macl.(var.).
A. geminatum Pasc. = *A. punctum* Cav.

The first mentioned have the claim to precedence, except in the case of the doubtful *A. virescens* Boisd.

This brings the present number of the species to fifty-four, of which the following table will afford some guide.

Tabulation of Species.

(N.B.—Size large means larger than 16 mm., medium means from 12-16 mm., small means less that 12 mm.).

Section i. Intercoxal process split in front and more or less truncate: Elytra seriate-punctate, not striate; intervals flat or slightly elevated. Third joint of antennæ about equal in length to that of the fourth and fifth combined.

A. Not or very little pilose.

Size large.

Colour bronze.

1. Pronotum finely punctate, elytral punctures large, elongate, and nearly continuous..... ...*A. auratum* Pasc.

Size medium.

. Pronotum longitudinally rugose, elytral punctures more distant.... ....*A. plicigerum* Pasc. var. *rugosicolle* Macl.

3. Pronotum with thickened edge, elytra with series of round foveæ and small punctures..... ....*A. lindense* Blackb.
4. Sides of pronotum angulate; intercoxal process without carinulate edge.....*A. angulatum* Blackb.
5. Narrower than preceding; intercoxal process with carinulate edge..... .....*A. angulicolle* Casteln.

Colour black.

6. Elytral punctures small, with few larger punctures..... *A. æquale* Blackb.

Size small.

Colour dark bronze.

7. Edge of pronotum thickened, margins explanate. Elytra with large and small punctures irregularly arranged in series..... .....*A. vicarium* Pasc.
8. Discolorous. Head and pronotum shining black, elytra dark bronze, pronotum nearly smooth.....*A. scytalicum* Pasc.
9. Brilliant bronze, shining.....*A. nitidum* Carter.

B. Strongly pilose.

Size large.

Colour greeny-bronze.

10. Hind angles of pronotum defined and rectangular; elytra with alternate intervals raised..... *A. hackeri*, n.sp.

Size medium.

Colour bronze.

11. Disc of pronotum with large round punctures, sides roundly angulate in middle.....*A. pilosum* Pasc.

Colour darker than 11.

12. Disc-punctures tending to confluence, sides less angulate. *A. scutellare* Pasc.

Section ii. Intercoxal process marginal, and more or less rounded.

Subsection A. Third joint of antennæ longer than fourth and fifth combined, intervals of elytra elevated.

a. Intervals of elytra regular (not interrupted).

Size large.

Colour black.

13. Elytra sulcate-punctate and sides subparallel..... ..... *A. occidentale* Blackb.
14. Elytra sulcate.....*A. striatum* Pasc.
var. colour greenish.....*A. viridipenne* Macl.

Size medium.

15. Colour bronze..... ....*A. simplex* Blackb.

Size small.

Colour bronze with violet reflections.

16. Elytral series minutely punctate..... *A. violaceum* Carter.
Pilose.
17. Elytral series punctate..... *A. heterodoxum* Lea.
β. Intervals of elytra more or less interrupted.
Size medium.
Colour black or greenish.
18. Elytral intervals near suture generally interrupted.....
A. porcatum Fabr.
A. caraboides Kirby.
Colour green, subnitid.
19. All elytral intervals interrupted..... *A. augurale* Pasc.
20. More nitid than 18..... *A. aerarium* Pasc.
Colour dark bronze, prothorax sometimes greenish.
21. Elytral intervals interrupted only on sides and apex.....
A. similatum Germ.
22. Larger and more convex; pronotum more widely rounded and abruptly contracted at base..... *A. obesum* Pasc.
23. Narrower, more elongate and depressed than 21, third joint of antennæ very long..... *A. tenebrioides* Erichs.
Colour blue-black.
24. Elytra impunctate..... *A. tropicum* Blackb.
Size small.
Colour blue.
25. Elytral intervals interrupted only near apex... *A. coeruleum* Carter.

Subsection B. Third joint of antennæ equal in length to fourth and fifth combined.

γ Intervals of elytra raised and more or less interrupted.
Not pilose.
Colour black, nitid.
26. Size medium..... *A. capitatum* Lea.
Size smaller.
Colour black, fuscous.
27. Foliate sides of pronotum reflexed, elytral intervals reticulate..... *A. reticulatum* Carter.
Pilose.
Colour blue-black.
28. Form somewhat square, pronotum rugosely punctate.....
A. barbatum, n.sp.
δ. Intervals of elytra not raised, elytra seriate-punctate.
29. *A. geminatum* Pasc.
A. punctum Carter.

Subsection C. Third joint of antennæ less than fourth and fifth combined; intervals of elytra flat or slightly convex, never interrupted, striate-punctate. Posterior angles of prothorax generally obtuse, little defined or obsolete.

Colour bronze.

30. Size large, punctures in striæ small, striæ indistinct..... *A. helmsi* Carter.

31. Size smaller, punctures in striæ large, striæ distinct..... *A. alpicola* Blackb.

32. Size medium, broadly ovate, punctures in striæ small and close..... *A. calosomoides* Kirby.
A. harpaloides Boisd.
(?)*A. geniale* Pasc.

33. Bicolorous. Flatter, narrower, more elongate than preceding. *A. bicolor*, n.sp.

Colour bronze.

34. Convex; pronotum nearly smooth, with hind angles obsolete, large and small punctures in striæ; antennæ of male long..... *A. convexiusculum* Macl.

35. Tarsi red; hind angles of pronotum distinct, elytral striæ irregularly punctate, punctures varying in size and distance..... *A. licinoides* Kirby.
A. cisteloides Erichs.

36. Antennæ longer than preceding, hind angles of pronotum produced..... *A. ancilla* Pasc.

37. Elongate-ovate; pronotum nearly smooth; shoulders obsolete; punctures in striæ minute and close..... *A. steropoides* Pasc.

38. Form like 37, colour pitchy brown, nitid; striæ broken..... *A. ruptum* Pasc.

Colour brilliant bronze, nitid.

39. Intervals quite flat..... *A. ellipticum* Blackb.

Size small.

40. Form like *A. calosomoides*, but narrower and coppery; pronotum nearly smooth, punctures in striæ unequal..... *A. reductum* Pasc.

Colour dark bronze.

41. Very convex, hind angles obsolete..... *A. rotundum*, n.sp.

Elytra pustulose.

Colour dark bronze.

42. Pronotum coarsely rugose, hind angles rectangular..... *A. pustulosum* Blackb.

43. Pronotum less rugose, hind angles widely obtuse..... *A. victoriæ* Blackb.

44. Size smaller, pronotum canaliculate.....*A. canaliculatum* Carter.
Colour lighter.
45. Prothorax subangulate.....*A. pestiferum*, n.sp.
Colour violet-bronze.
46. Form depressed and elongate.....*A. subdepressum*, n.sp.

Subsection D. Antennæ shorter, generally not reaching beyond base of prothorax in the female; size smaller; third joint of antennæ less than fourth and fifth combined; elytra striate-punctate; intervals flat.
Colour bronze.
47. Short broad form, intervals of elytra with regular shallow impressions.....*A. abbreviatum* Boisd.
A. impressum Blanch.
Var. more robust, prothorax more convex.....*A. latum* Pasc.
Colour dark bronze.
48. More slender; prothorax evenly rounded at sides, with rounded hind angles; elytral punctures regular.....
A. brevicorne Blessig.
A. neophyta Pasc.
?*A. virescens* Boisd.
Colour black.
49. Elytra more parallel.....*A. regulare* Lea.
50. More coarsely punctate than 48, with elytral intervals more convex.....*A. inconspicuum* Blackb.
Colour black or pitchy brown.
51. Size small, base of pronotum obliquely foveate.....
A. tasmanicum Champ.
Colour bronze.
52. Form narrow, sides of prothorax subparallel, disc smooth...
A. commodum Pasc.
53. Near 51, with elytral intervals nodulose.....*A. nodulosum* Champ.
54. Antennæ subclavate, elytra subparallel and glossy.....
A. orphana Pasc.

Adelium barbatum, n.sp.

(Plate iii., fig.1.)

Truncate-ovate, moderately convex, shining; black with a bluish tinge, antennæ and tarsi piceous, abdomen black; upper surface and legs clothed with short upright black hairs.

Head: labrum round, salient and hirsute; epistoma and front densely and rugosely punctate. Eyes large. Antennæ stout and moderately long, third joint equal to fourth and fifth jointly.

Prothorax transverse, half as wide again as long, apex emarginate, anterior angles widely acute and prominent, extending to the eyes; sides widely rounded, widest behind middle, then sinuately narrowed at posterior angles, these turned downwards and outwards forming a subrectangular tooth. Base truncate. Disc densely coarsely rugosely punctate, punctures tending to coalesce and to become striolate on the foliaceous margin (this margin concave and reflexed). The whole pronotum concave and reflexed on the sides. *Scutellum* triangular with apex raised, punctate. *Elytra* wider at base than prothorax at widest; convex, with shoulders round and subrectangular; sides slightly bulging about half-way, apex bluntly acute. Interruptedly striate-punctate, striæ reticulated by transverse lines, forming series of rectangular foveæ, each filled with coarse punctures. Intervals raised, crenate and shining, becoming more interrupted towards the sides and apex (as in *A. porcatum* Fabr.), mere lines of pustules towards apex. Epipleuræ, last two segments of abdomen and legs closely punctate, the rest of abdomen with a few much finer punctures. Fore and intermediate tibiæ slightly curved and thickened at apex, hind tibiæ straight. Whole legs densely pilose. *Dimensions*—♂ 12·5 × 5 mm.; ♀ 14 × 6 mm.

Loc.—Endeavour River, Dawson River, Port Denison, Q. (collected by Mr. G. Masters).

The above insect is unnamed in the Macleay Collection, specimens of which have been courteously supplied me by Mr. Masters. While belonging to the *A. porcatum* and *A. augurale* group, it is easily distinguished from these by its smaller size, different colour, and its pilose clothing, which is thickest on the head and pronotum, and more thinly distributed on the elytra. In size and facies it approaches *A. cœruleum* mihi, from which species it differs widely in colour and its elytral sculpture. In its lateral prothoracic foliation it resembles *A. reticulatum* mihi. The pile is much shorter than in *A. pilosum* Pasc., to which insect it otherwise bears little resemblance.

From *A. tropicum* Blackb., it evidently differs in size and punctate elytra; also of that species Mr. Blackburn says,

"third joint of antennæ much longer than the fourth and fifth," whereas in *A. barbatum* it is just equal to those.

A. barbatum is the same species as that labelled with an MS. name in the Bates Coll. A narrower form, also labelled with an MS. name of Bates', I have from the Dawson River, Queensland. This differs from *A. barbatum* in its more angulate-sided prothorax and less pilose clothing. Having only one imperfect specimen I am unwilling at present to describe it.

Adelium hackeri, n.sp.

(Plate iii., fig.2.)

Very broad, subovate, moderately convex, dark coppery-bronze, obscurely shining, slightly pilose; antennæ and tarsi fuscous-brown, with the usual lighter-coloured tomentum on the underside of tarsi.

Head: labrum trapezoidal and prominent, epistoma closely, and front rugosely punctate; at each angle formed by the front with the epistomal ridge is a seta bearing a long hair. Eyes large and widely separate. Antennæ stout and short, not reaching the base of prothorax when set back; third joint as long as the fourth, fifth, and half the sixth jointly; joints 3-10 subovate. *Prothorax* cordate, half as wide again as long, strongly emarginate anteriorly, obtusely pointed anterior angles reaching to the eyes, apex bisinuate, sides widely rounded to the greatest width behind the middle, and crenate on the border (which is raised and thickened near the front angles), then sinuately contracting near the base to meet the prominent subrectangular hind angles. Base truncate. Disc densely rugose, with rugosity generally longitudinal, except on the foliaceous margins, where it is transversely striolate. Thinly pilose with short, upright, black hairs. *Scutellum* large, curvilinear-triangular, with strongly rounded apex, punctate on sides. *Elytra* truncate-ovate, convex, slightly wider (by measurement, though not visibly) than prothorax at its widest; shoulders widely rounded, sides subparallel for half their length, contracting abruptly near the apex.

Interruptedly striate-punctate, the ten striæ on each elytron consisting of long foveæ of varying lengths separated by cross bars on the same plane as the intervals. Alternate intervals, 1st, 3rd, 5th, 7th, sharply raised, having a triangular cross-section, the 2nd, 4th, 6th and 8th having a rounded surface. Basal portion of elytra slightly pilose, as in the prothorax. Epipleuræ wide and coarsely punctate, the legs and last two segments of abdomen finely punctate. On each segment of abdomen are a few scattered setæ, each bearing a long hair, the last segment containing from eight to ten such setæ. Body beneath black and shining. *Legs*: intermediate tibiæ slightly curved, other tibiæ straight. *Dimensions* 17 × 8 mm.

Loc.—Wolfram Camp, N.W. of Cairns, Q. (collected by Mr. H. Hacker).

I have dedicated this species to Mr. Hacker, who has kindly presented me with one specimen. It belongs to the *A. plicigerum* Pasc., and *A. rugosicolle* Macl., group in its elytral sculpture and general facies, but differs from both in its pronounced hind angles and crenate border to prothorax, in its pilose covering, and in its wider and more convex form. It is readily distinguished by its great width as compared with its length. From *A. auratum* Pasc., it differs more widely in its rugose pronotum, and deeper elytral sculpture *inter alia*.

Adelium canaliculatum, n.sp.

(Plate iii., fig.4.)

Oval, moderately convex, dark bronze, shining; palpi, antennæ and tarsi pitchy-brown.

Head flat, with epistomal ridge sharply defined by arcuate groove; finely but sparingly punctured on front, more densely punctured on epistoma. Eyes very large and widely elliptic. Antennæ rather long in the male, with almost linear joints, gradually thickened towards the apex, third joint slightly shorter than fourth and fifth combined, apical joint a little longer and stouter than the tenth. *Prothorax* about one-third broader than

long, truncate in front and behind, anterior angles slightly produced and obtuse, rather narrower at base than at apex, sides widely rounded with foliaceous margins having a narrow raised shining border and slightly arcuate towards anterior and posterior angles, the latter widely obtuse but defined. Disc and sides coarsely and rather irregularly punctate with a few larger depressions. Central channel shallow but distinct, not extending to apical border. *Elytra* about two and one-third times as long as the prothorax, and wider than it, shoulders rather squarely rounded, ovate; sides of male little rounded, of female more widely expanded, and sharply contracting to a somewhat pointed apex; striate-punctate, with ten lines of punctures on each elytron, the last on the side; punctures rather small, close and regular in size and distance; intervals flat or very slightly convex, but towards sides and apex having lines of thin, more or less elongate shining pustules; beneath black, shining and finely punctured; intercoxal process margined and truncate, anterior tibiæ very slightly curved, other tibiæ straight; anterior tarsi of male with four basal joints widened in the male. *Dimensions*—♂ 10·5 × 4·5 mm.; ♀ 11 × 5 mm.

Loc.—Botany Bay and Kogarah, near Sydney.

This species comes under Sect. ii.C in my classification, and is nearest to *A. pustulosum* Blackb., from which it differs in (1) smaller size, (2) narrower (in proportion to elytra) and smoother prothorax, (3) prothorax having central canal, (4) finer and more regular punctures in elytral striæ, (5) more ovate shape of elytra, and (6) darker colour. I have six specimens before me, as well as a cotype of Mr. Blackburn's *A. pustulosum*, and the above are only the most easily defined of the many differences that exist between these two species. *A. pustulosum* is altogether a more robust and coarsely sculptured insect, while the channelled prothorax is a rare character in this genus that readily distinguishes this species. From *A. victoriæ* Blackb., it differs in size, colour, canaliculate pronotum, finer sculpture, *inter alia*.

ADELIUM PESTIFERUM, n.sp,

(Plate iii., fig.6.)

Narrow, elliptic, coppery-bronze, shining; oral organs, tarsi and apical joints of antennæ reddish.

Head : labrum narrow, prominent, epistomal ridge pronounced, frontal disc very concave, the whole coarsely and densely punctured. Eyes large and widely elliptic. Antennæ of male long, with third joint a little less than fourth and fifth combined. *Prothorax* broader than long (in the proportion of 7 : 10), sinuate at apex, with anterior angles well advanced but obtuse, sides widely rounded to meet the subrectangular and well defined hind angles. Base truncate. Disc convex, separated from foliaceous sides by a short, deep, curved sulcus, whose continuation forward is indicated by a second small fovea near front angle. Strongly, but not rugosely punctured, with slightly raised vermiculate lines irregularly placed. Medial line is indicated by slight depression. (In one specimen this depression is only shown near base). *Elytra* oval-elliptic, moderately convex, shoulders rounded. Widest in anterior half, then gradually tapering (as in *A. ellipticum* Blackb.), towards apex. Punctate-striate, with intervals strongly pustulated with shining nodules. Abdomen and legs black, shining; posterior intercoxal process rounded, truncate and entire. Anterior femora slightly curved, other femora straight. *Dimensions* 13 × 5 mm.

Loc.—Illawarra, N.S.W., Bulli to Nowra (collected by E. Ferguson and the author).

This species belongs to the class of *A. pustulosum* Blackb., and *A. canaliculatum* Carter. From the former it is readily distinguished by its lighter and unicolorous bronze, by its pronounced hind angles to prothorax, and its more elongate-elliptic form; from the latter it is more strongly differentiated by the shape of prothorax (see Plate iii.), its larger size and brighter colour. It is the most markedly *pustulose* Adelium known to me, the side and apical portions being studded with shining nodules varying in shape from round to elongate, the anterior central intervals only being more or less smooth. The punctures in elytral striæ

are unequal in size, those in the striæ nearest the suture being larger and deeper than in the striæ towards the sides.

Adelium bicolor, n.sp.

(Plate iii., fig.5.)

Elongate rather flat; head and prothorax greenish-bronze, shining; elytra reddish-bronze; palpi, antennæ and tarsi reddish-brown.

Head rugosely punctate, epistomal ridge rounded and prominent. Eyes large and prominent. Antennæ of male moderately long, of female much shorter; third joint less than the fourth and fifth combined. *Prothorax* wider than long (3 × 5 mm.), with greatest width behind the middle, with anterior angles slightly produced forward and obtuse, truncate behind; sides widely rounded with foliaceous margins and raised border throughout; thicker on sides than in front and behind. Posterior angles obtuse but defined. Disc finely punctate, with some irregular larger depressions. Median canal faintly defined. *Elytra* a little wider than the prothorax and about three times as long (9 × 5·3 mm.), shoulders widely rounded, sides tapering towards apex; in female elytra more convex, wider and stouter. Striate-punctate, striæ with punctures large, regular and close; intervals smooth, very slightly convex, and without any sign of tuberculation towards apex. Abdomen and sternum black and shining, last segment of former finely punctate. Tarsi of male much wider than those of female. Intercoxal process entire and truncate. *Dimensions*—♂ 14 × 5·3 mm.; ♀ 14·5 × 6 mm.

Loc.—Mount Kosciusko.

This species comes under Subsection C of my classification, and is near the *A. calosomoides* Kirby, type, from which it is distinguished by colour and by its flatter and more elongate-ovate form, less transverse prothorax and larger punctures in elytral series. It is very common on Mount Kosciusko, above 4000 ft. altitude. Fresh specimens show the bicoloration to a marked degree, the bright bronze becoming darker with age. Distinguished from *A. similatum* group by its uninterrupted intervals.

Adelium subdepressum, n.sp.

(Plate iii., fig.3.)

Elongate-ovate, rather flat; bright purple-bronze, moderately shining; oral organs, antennæ and tarsi reddish-brown, beneath a darker bronze shining.

Head rather coarsely punctate, epistomal ridge sharply defined behind by arcuate groove. Antennæ elongate in the male, joints lineate, and only slightly thickened towards the apex, third joint about equal to fourth and fifth jointly. *Prothorax* nearly twice as broad as long, very little convex, and widely explanate, with greatest width behind the middle, moderately striate in front, truncate at base, narrower at base than at apex; sides widely rounded, scarcely sinuate near anterior angles, more abruptly converging at posterior angles, the former of these slightly produced and obtuse, the latter obsolete, a narrow raised border throughout strongly defined towards anterior angles, less perceptible elsewhere. Disc very lightly rugose, with shallow punctiform impressions. Central canal faintly impressed on middle portion. A few setigerous punctures on the explanate margins. *Elytra* about as wide as prothorax at widest and about two and a half times as long. Shoulders widely rounded and sharply margined. Disc somewhat flat and depressed at suture, striate-punctate, with ten rows of punctures on each elytron, the last two on the sides, the punctures large, transverse and close; intervals very slightly raised but strongly tuberculate towards sides and apex. Last segment of abdomen strongly punctured. Intercoxal process margined and rounded. *Dimensions*—♂ 14·5 × 5·5 mm.; ♀ 16·5 × 7 mm.

Loc.—Bombala and Moruya, N. S.W.

I am indebted to Mr. Cheesman, of Moruya, for the three specimens I possess. I adopt the MS. name with which I found a similar insect labelled in the Bates Collection of the British Museum with other undescribed Adelia. It is easily recognised by the combination of bright bronze colouring and strongly tuberculate elytra and depressed form.

Adelium rotundum, n.sp.

(Plate iii., fig. 7.)

Shortly ovate, dark bronze, sometimes greenish, shining, very convex. Tarsi, palpi and antennæ brown.

Head: front rugosely punctate; epistomal ridge prominent and strongly punctate, punctures large; labrum salient. Eyes large, prominent and coarsely faceted. Antennæ moderately stout and long and both they and the palpi pilose, third joint less than fourth and fifth combined. *Prothorax* convex, width twice the length, greatest width near base, much narrower in front; truncate at base and apex. Front angles widely obtuse and scarcely produced forward; sides strongly rounded and widened towards base, meeting the base in a circular curve without any indication of hind angles. Disc coarsely punctured, punctures large and separate. Two shallow impressed foveæ near base (in female only). Without distinct foliaceous margins, though their position is indicated by a more or less distinct ridge and sulcus, the sulcus never extending beyond half-way from the front. *Scutellum* triangular, with rounded apex, punctate. *Elytra* strongly convex and oval. In the male the width is about the same as the base of prothorax, in the female width is greater than that of prothorax. Disc with about ten striæ on each elytron; these closely punctate. Intervals scarcely raised and minutely punctate. Shoulders widely rounded; sides, in female, gently rounded, in male subparallel to near apex, then narrowing to a blunt apical point. Epipleuræ, femora and apical segment of abdomen finely punctate. Beneath a shining blue-black. *Dimensions*—♂ 10 × 4·5 mm.; ♀ 12 × 6 mm.

Loc.—Monaro, N. S.W. (near Jindabyne; collected by author).

This species is the most convex Adelium known to me, and can be readily recognised by this feature alone, combined with its peculiar prothorax. There is more than the usual sexual difference indicated by size, especially the width of female specimens.

Cardiothorax.

Cardiothorax batesi Carter = *C. aericollis* Pasc.—I would take this, my earliest, opportunity to point out the above synonomy, of which I was made certain by a comparison of my type with Pascoe's in the British Museum. I was certainly misled by Bates' remark as to its being a mere colour-variety of *C. walckenaerii* Hope, whereas I pointed out in my diagnosis of *C. batesi* its several points of distinction from that species; the name *C. batesi* must therefore be sunk.

EXPLANATION OF PLATE iii.

Fig. 1.—*Adelium barbatum.*
Fig. 2.—*A. hackeri.*
Fig. 3.—*A. subdepressum.*
Fig. 4.—*A. canaliculatum.*
Fig. 5.—*A. bicolor.*
Fig. 6.—*A. pestiferum.*
Fig. 7.—*A. rotundum.*

NOTES AND EXHIBITS.

Mr. Carter exhibited his collection of representatives of the genus *Adelium*, comprising a majority of the known species, in illustration of his paper.

Mr. Kesteven exhibited a dissected specimen of *Hyla aurea* which contained in its stomach a somewhat smaller specimen of apparently the same species.

Mr. A. A. Hamilton exhibited a two-flowered specimen of the rare orchid *Adenochilus Nortoni* from Lawson on the Blue Mountains, whereas the type-specimens described by Fitzgerald had the flowers solitary; specimens of *Persoonia angulata* R.Br., from Wentworth Falls, Leura and Katoomba, an extension of the range of a somewhat rare plant; and an example of the Waratah (*Telopea speciosissima* R.Br.) from Waterfall, with pinnatisect foliage of an uncommon character.

Dr. Greig-Smith showed a Schizosaccharomyces, isolated from molasses; and he pointed out the relations which the genus has with the Saccharomycetes and with the Bacteria.

Mr. A. Basset Hull exhibited a series of eggs of the Silver Gull (*Larus novæ-hollandiæ* Stephens) from the gull rookery at Montague Island, displaying two striking mutations in colour. The normal egg is very variable in the shade of the ground-colour, and the markings also vary considerably; but from pale olive-green to deep olive-brown, slightly to heavily streaked or blotched with blackish-brown markings, will do for a general description. The two abnormal varieties exhibited were (A.) uniform pale blue, without any trace of markings: (B.1) glossy white, faintly blotched with pale red and purplish-red suffused markings and a few dull red spots, distributed over the whole shell; (B.2) creamy-white, blotched with purplish-red suffused markings, and larger dull red spots and markings, dis-

tributed over the whole shell. Of variety A one specimen (exhibited) was found in a nest together with a heavily blotched normal egg; another was found with two normal eggs, and the clutch of three (exhibited) was forwarded from Montague Island a little later in the season. Of variety B1 the first specimen (exhibited) was found alone in a nest surrounded by dozens of other nests, all of which contained normal eggs. Of variety B2 a pair was found in a nest in the centre of the largest group of nests in the rookery; and a pair (exhibited) was shortly after forwarded from the Island. Such striking departures from the normal colour had not previously been recorded by any of the Australian authorities; but Mr. Tom Iredale, of Christchurch, had met with a blue mutation in the eggs of *Larus ridibundus*, *L. fuscus*, and *L. argentatus*, collected in the North of England, in 1889-90; and also in the eggs of *L. dominicanus* and *Sterna frontalis* in New Zealand.

Mr. Cheel exhibited a series of specimens illustrating the habits and depredations of a leaf-cutting bee (*Megachile* sp.), and of two pollen-collecting bees (*Podalirius cingulatus* Fabr., and *Sarapoda bombiformis* Smith). The contents of a nest in the ground, comprising a good handful of oblong or roundish pieces of the foliage of *Laburnum vulgare* collected by the Megachile were shown, and also a branch of *Solanum xanthocarpum* from a plant which used to fruit freely, but which in recent years had borne no fruit, apparently through being deprived of pollen by the operationsof the pollen-collecting bees. For the identification of the insects, Mr. Cheel expressed his indebtedness to Mr. W. J. Rainbow, F.L.S., of the Australian Museum.

Mr. Goddard exhibited an interesting series of freshwater crustaceans, including species of *Anaspides* and *Phreatoicus*, from ponds on Mount Wellington and Mount Ben Lomond, Tasmania; and examples of freshwater leeches (*Glossiphonia*) from Tasmania and New South Wales.

Mr. Fred Turner exhibited, and offered observations upon various botanical specimens comprising *Salicornia tenuis* Benth., a native saltbush forwarded from Wongalea Station, Gunbar District, with the report that it had recently sprung up, covering an area of six hundred acres; *Grevillea arenaria* R.Br., var. *canescens*, from the Bathurst district, where it was said to be greedily eaten by sheep; and *Panicum tenuissimum* Benth., collected at Rose Bay, Sydney, the most southerly station so far recorded for this grass.

The Secretary, on behalf of Dr. T. L. Bancroft of Brisbane, exhibited a named collection of Queensland mosquitoes, comprising representatives of twenty-four out of the thirty-two species described in the recently published "List of the Mosquitoes of Queensland, &c." (Annals of the Queensland Museum, No.8,1908); and he stated that, at Dr. Bancroft's request, the specimens were to be presented to the Macleay Museum, to supplement the collection which the late Mr. Skuse had studied.

Mr. A. G. Hamilton sent for exhibition a very complete and interesting series of germinating seeds and young seedlings of one of the Mistletoes (*Loranthus exocarpi* Behr), forwarded to him by Mr. C. C. Brittlebank of Myrniong, Victoria.

Mr. Fletcher showed a series of lantern slides prepared from photographs of germinating seeds, and young seedlings of various species of Loranthus; and illustrating the arrangement (into two groups, each of these again divisible into two sections) which the characters of the species studied from the life-history point of view, suggested. As fruits of *L. dictyophlebus*, *L. alyxifolius*, *L. grandibracteus*, and some of the little known brush and scrub Loranths had not been procurable hitherto, the arrangement indicated would probably require modification; and further knowledge was desirable before entering into particulars.

WEDNESDAY, MAY 27TH, 1908.

The Ordinary Monthly Meeting of the Society was held in the Linnean Hall, Ithaca Road, Elizabeth Bay, on Wednesday evening, May 27th, 1908.

Mr. J. H. Maiden, F.L.S., &c., Vice-President, in the Chair.

Mr. L. A. COTTON, B.A., B.Sc., Demonstrator in Geology, University of Sydney, was elected an Ordinary Member of the Society.

A letter from Mr. J. R. Garland, the retiring Hon. Treasurer, thanking the Members for their expression of appreciation and good will at last Month's Meeting, and intimating that he was looking forward to meeting them again very soon, was read to the Meeting.

The Chairman announced that, under the provisions of Rule XXV., the Council had elected Mr. J. H. Campbell to be Hon. Treasurer for the current Session.

Circulars detailing the arrangements for the Third International Botanical Congress, to be held in Brussels in 1910, were laid upon the table, and the attention of Members directed to them.

The Donations and Exchanges received since the previous Monthly Meeting, amounting to 9 Vols., 77 Parts or Nos., 16 Bulletins, 3 Reports, and 26 Pamphlets, received from 58 Societies, &c., were laid upon the table.

NOTES AND EXHIBITS.

Dr. C. Anderson exhibited some fine crystals of Rhodonite from Broken Hill, comprising specimens kindly lent by the National Museum, Melbourne, and the Geological Department of Sydney University, with others from the Collection in the Australian Museum. New values for the axial ratios and angles have been obtained, viz. :—

$$a : b : c = 1{\cdot}147922 : 1 : 1{\cdot}831584.$$

$$\alpha = 94^\circ\ 46'; \ \beta = 111^\circ\ 34'; \ \gamma = 85^\circ\ 56'.$$

The values given by Goldschmidt, whose position and axes have been chosen, are :—

$$a : b : c = 1{\cdot}1550 : 1 : 1{\cdot}8317.$$

$$\alpha = 94^\circ\ 42'; \ \beta = 111^\circ\ 27'; \ \gamma = 86^\circ\ 6'.$$

The following new forms were recognised:—(103), (207), (013), ($0\bar{1}3$), ($0\bar{1}4$), ($0\bar{1}5$), ($0\bar{3}7$), ($\bar{1}\bar{1}2$), ($\bar{2}01$).

The corresponding indices for Dana's position are :—(223), (447), ($2\bar{2}3$), ($\bar{2}23$), ($\bar{1}12$), ($\bar{2}25$), ($\bar{6}67$), ($\bar{2}01$), ($\bar{4}\bar{4}1$).

Dr. Greig-Smith exhibited a culture of a slime-forming rod-shaped bacterium associated with the slime which forms on the household sponge and which is generally ascribed to soap. Similar rod-shaped bacteria are to be found in the slime which forms inside water-cisterns.

Mr. Fred. Turner exhibited botanical specimens, namely, *Linum flavum* Linn., a European plant now acclimatised on the Upper Hunter River; *Panicum spectabile* Nees, the famous "Coapim" of Angola, Western Africa, raised from seed received at the Botanic Gardens, Brisbane, from the Royal Botanic Garden, Kew, London; *Cynodon dactylon* Pers., showing abnormal inflorescence, from the neighbourhood of Maitland, on the Hunter River, the flowering peduncle being surmounted by seven spikes instead of four as usual,—the first time he had

seen it in that condition (*vide* Agricultural Gazette of New South Wales, Vol.iv., p.312, for a record of another abnormality). He also referred to the fungus *Lysurus australiensis* C. & M., which had lately sprung up pretty plentifully on a buffalo grass lawn at North Sydney.

Dr. Cleland contributed a "Note on Twists in the Bark of the Jarrah (*Eucalyptus marginata* Sm.)." Of one hundred trees observed in the neighbourhood of Perth, W.A., four showed a decided left twist, sixteen a slight left twist, forty-four were straight, twenty-four showed a slight right twist, nine a marked right twist, and in three the twist was undecided (*i.e.*, irregular). As there appeared to be no indication of a tendency to tree-growth in a spiral direction, the explanation was offered that, when young, a predominant branch probably extended to one or other side and, being played on by the prevailing wind, caused the young stem to become twisted to some extent. Later such a branch may have died and disappeared. The explanation offered seems to be favoured by the fact that contiguous trees are often twisted in opposite directions.

Mr. Fletcher showed specimens of *Loranthus Bidwillii* Benth., from north of the Warrumbungle Mountains, collected by Dr. H. I. Jensen, the host being a species of Pine (*Callitris* sp.); and from near Young, N.S.W., parasitic upon the Black Pine (*Callitris calcarata* R.Br.), collected by Mr. T. G. Sloane. The species was described in the "Flora Australiensis" from Wide Bay, Q., without reference to the host; it was subsequently found in South Queensland upon *Callitris cupressiformis* Vent., by the late Rev. B. Scortechini [Proc. Linn. Soc. N.S.Wales, viii.p.251, 1883]; and recorded for the first time from New South Wales upon *Callitris* sp. by Mr. R. T. Baker from Murrumbo, Goulburn River [*op. cit.* 1896, p.452]. Though not common, the species is evidently fairly widely distributed; and it is of interest because, so far as known, it seems to be exclusively associated with Conifers.

THE BEHAVIOUR OF *HYLA AUREA* TO STRYCHNINE.

By H. G. Chapman, M.D., B.S., Demonstrator of Physiology in the University of Sydney.

(From the Physiological Laboratory of the University of Sydney.)

It has been noted not infrequently that the common Australian frog, *Hyla aurea*, is much less susceptible to the poisonous alkaloid strychnine than the European frog of the genus Rana.

This diminished susceptibility or increased resistance can be most easily shown by a determination of the minimal lethal dose of strychnine for Hyla. The minimal lethal dose for various species of Rana has been measured by various observers. There seems to be a general agreement that this lies between 2 mg. and 5·5 mg. per kilogram of body-weight. Falck* found that to kill a frog with strychnine nitrate at least 2 mg. per kilo must be injected. Sollman,† working in America, gives 5·5 mg. per kilo. as the lethal dose for the frog.

---

* Volkmann's Sammlung Klinischer Vorträge, No.69.

† Text-Book of Pharmacology, Philadelphia, 1901, p.171.

To determine the minimal lethal dose for *Hyla aurea*, 108 experiments have been carried out. These have been conducted at different periods of the year to render obvious the effect of the winter and summer seasons. Series of experiments have also been performed to exhibit any differences in resistance between frogs fresh from their native swamps, and frogs from the laboratory tank.

In all cases the strychnine was dissolved as sulphate and introduced into the dorsal lymph sac by a hypodermic needle. The concentration of the solution of strychnine was adjusted to allow the introduction of the poison in less than 1 c.c. of normal salt solution. For most experiments a solution containing 5 mg. of strychnine as sulphate in 1 c.c. fluid was employed. The solution was measured in a pipette carefully graduated into hundredths of a cubic centimetre. The amount for each dose measured by the pipette was then sucked up by the needle and injected. The experiments were conducted in series of six frogs each. These were weighed to the nearest decigram and kept on a board under large glass beakers during the experiment. Moistened cotton wool was placed beneath the beaker. Each twenty-four hours the whole was cleaned to avoid infection of the frogs. The time at which the frogs were injected was noticed and the period between the first spasm and the injection noted. Frequent taps were given to the board on which the frogs were placed to elicit convulsions.

In the earlier series the frogs were not arranged in any order from the point of view of their weight. Later it was thought to be more advantageous to arrange the frogs in such an order that the heaviest frog received the smallest dose per gm. of weight and the lightest frog the greatest dose per gm. of weight. Although the absolute weight of the frog had little or no influence on the ultimate fate of the frog, it appeared that small frogs became convulsed earlier than large frogs.

Certain typical results are tabulated in Table i. in which the weight of the frogs, the dose, and the behaviour are recorded.

TABLE i.

No.	Date.	Wt. of Frog in gm.	Dose in mg. per gm. of weight.	Dose injected in mg.	Amount of fluid injected in c.c.	Number of minutes between injection and first spasm.	Result.
1	28/11/06	8 gm.	0·006 mg.	0·048 mg.	0·2 c.c.	—	No symptoms of poisoning.
2	28/11/06	8 gm.	0·007 mg.	0·056 mg.	0·22 c.c.	—	No symptoms of poisoning.
3	28/11/06	9 gm.	0·008 mg.	0·072 mg.	0·3 c.c.	—	No symptoms of poisoning.
4	29/11/06	16 gm.	0·009 mg.	0·15 mg.	0·15 c.c.	—	No symptoms of poisoning.
5	29/11/06	23 gm.	0·01 mg.	0·23 mg.	0·23 c.c.	—	No symptoms of poisoning.
6	29/11/06	21 gm.	0·015 mg.	0·31 mg.	0·31 c.c.	51 min.	Recovered by next day.
7	29/11/06	23 gm.	0·025 mg.	0·57 mg.	0·57 c.c.	24 min.	Recovered by next day.
8	30/11/06	11 gm.	0·03 mg.	0·33 mg.	0·33 c.c.	24 min.	Recovered by next day.
9	30/11/06	18·7 gm.	0·04 mg.	0·72 mg.	0·72 c.c.	18 min.	Recovered by next day.
10	3/12/06	13 gm.	0·05 mg.	0·65 mg.	0·13 c.c.	15 min.	Recovered by next day.
11	3/12/06	10 gm.	0·06 mg.	0·6 mg.	0·12 c.c.	7 min.	Recovered by next day.
12	3/12/06	8 gm.	0·07 mg.	0·56 mg.	0·11 c.c.	6 min.	Recovered by next day.
13	3/12/06	19 gm.	0·08 mg.	1·52 mg.	0·3 c.c.	6 min.	Dead in 16 hours.
14	3/12/06	10 gm.	0·09 mg.	0·9 mg.	0·18 c.c.	4 min.	Recovered by next day.
15	3/12/06	12 gm.	0·1 mg.	1·2 mg.	0·24 c.c.	3 min.	Recovered by next day.
16	4/12/06	8·3 gm.	0·11 mg.	0·91 mg.	0·18 c.c.	4 min.	Dead in 21 hours.
17	4/12/06	12 gm.	0·12 mg.	1·2 mg.	0·24 c.c.	5 min.	Dead in 21 hours.
18	4/12/06	13·8 gm.	0·13 mg.	1·79 mg.	0·36 c.c.	4 min.	Dead in 21 hours.
19	13/12/06	18 gm.	0·16 mg.	2·88 mg.	0·58 c c.	4 min.	Dead by next morning.
20	13/12/06	14·8 gm.	0·18 mg.	2·6 mg.	0·53 c.c.	3 min.	Recovered. Spasms present for 120 hours.
21	13/12/06	18·9 gm.	0·2 mg.	3·8 mg.	0·76 c.c.	3 min.	Dead by next morning.

TABLE i.—*(Continued).*

No.	Date.	Wt. of Frog in gm.	Dose in mg. per gm. of weight.	Dose injected in mg.	Amount of fluid injected in c.c.	Number of minutes between injection and first spasm.	Result.
22	14/5/07	24·8 gm.	0·05 mg.	1·24 mg.	0·25 c.c.	6 min.	Recovered by next morning.
23	14/5/07	18·1 gm.	0·07 mg.	1·26 mg.	0·25 c.c.	5 min.	Recovered by 48 hours.
24	14/5/07	15·6 gm.	0·09 mg.	1·4 mg.	0·28 c.c.	4 min.	Dead by 48 hours.
25	15/5/07	19·5 gm.	0·1 mg.	1·95 mg.	0·39 c.c.	7 min.	Dead by 48 hours.
26	15/5/07	18·8 gm.	0·12 mg.	2·25 mg.	0·45 c.c.	4 min.	Dead by 72 hours.
27	15/5/07	17·5 gm.	0·14 mg.	2·45 mg.	0.49 c.c.	4 min.	Dead by 48 hours.
28	20/5/07	19·0 gm.	0·01 mg.	0·19 mg.	0·19 c.c.	53 min.	Recovered by 2 hours.
29	20/5/07	16·6 gm.	0·02 mg.	0·33 mg.	0·33 c.c.	42 min.	Recovered by 4 hours.
30	20/5/07	18·7 gm.	0·05 mg.	0·93 mg.	0·2 c.c.	10 min.	Recovered by next morning.
31	20/5/07	18·4 gm.	0·07 mg.	1·28 mg.	0·25 c.c.	7 min.	Recovered by 48 hours.
32	20/5/07	17·4 gm.	0·09 mg.	1·56 mg.	0·31 c.c.	6 min.	Recovered by next morning.
33	20/5/07	16·2 gm.	0·12 mg.	1·94 mg.	0·39 c.c.	4 min.	Recovered. Spasms present 72 hours.
34	20/5/07	16·1 gm.	0·16 mg.	2·57 mg.	0·51 c.c.	3 min.	Recovered. Spasms present 120 hours.
35	20/5/07	15·0 gm.	0·2 mg.	3·0 mg.	0·6 c.c.	1½ min.	Dead by 140 hours. Spasms present 120 hours.
36	29/5/07	27·1 gm.	0·05 mg.	1·35 mg.	0·27 c.c.	10 min.	Recovered by 48 hours.
37	29/5/07	23·1 gm.	0·09 mg.	2·08 mg.	0·41 c.c.	9 min.	Recovered by 48 hours.
38	29/5/07	22·3 gm.	0·13 mg.	2·9 mg.	0·58 c.c.	7 min.	Recovered by 72 hours.
39	29/5/07	21·5 gm.	0·17 mg.	3·6 mg.	0·72 c.c.	6 min.	Dead by 96 hours.
40	29/5/07	19·4 gm.	0·21 mg.	4·07 mg.	0·81 c.c.	5½ min.	Recovered. Spasms for 96 hours.
41	29/5/07	18·5 gm.	0·25 mg.	4·64 mg.	0·93 c.c.	5 min.	Dead by 48 hours.
42	29/5/07	18·2 gm.	0·27 mg.	4·89 mg.	0·97 c.c.	4 min.	Dead by 16 hours.

Although there are considerable variations, as will be noted later, the minimal lethal dose of strychnine for Hyla is to be expressed in terms of milligrams per gram of body-weight or grams per kilogram of body-weight. The increased resistance to strychnine of Hyla over Rana is therefore very considerable. Of the 108 frogs injected, 48 received doses of less than 0·1 mg. per gm. body-weight. Five died and forty-three recovered. The five which died received 0·02, 0·02, 0·08, 0·09, and 0·09 mg. per gm. respectively. The remaining 60 frogs received doses of 0·1 gm. per gm. or greater doses. Forty-six died and fourteen recovered. The frogs which survived may be classified as follows—three received 0·1 mg. per gm., two received 0·11 mg. per gm., two received 0·12 mg. per gm., one received 0·13 mg. per gm., two received 0·14 mg. per gm., and four received more than 0·15 mg. per gm. body weight.

If we adopt the principles set forth by Falck,* we shall determine the minimal lethal dose by adopting the dose at which an equal number of frogs died and recovered. It is found that this dose lies between 0·09 and 0·10 mg. per gm. body-weight. Table ii. gives a record of the number of frogs injected with each dose, the number which died, and the number which recovered.

During a number of the experiments the sex of each frog was noted. It was thought that as the female frogs weighed heavier than the male frogs owing to the large ovaries, some variation in the toxicity might be observed. No differences were, however, demonstrated in the effects of the doses of strychnine employed.

The difference† in the behaviour of frogs collected in summer (December) and those collected in winter (June) was, however, somewhat marked.

---

* *Loc. cit.*

† See Chapman, Proc. Linn. Soc. New South Wales, xxxi. p.362, 1906.

TABLE ii.

Dose in mg. per gm.	No. of frogs injected.	No. of frogs which died.	No. of frogs which recovered.
0·05 mg.	4	0	4
0·06 mg.	2	0	2
0·07 mg.	4	0	4
0·08 mg.	4	1	3
0·09 mg.	8	2	6
0·10 mg.	8	5	3
0·11 mg.	7	5	2
0·12 mg.	7	5	2
0·13 mg.	5	4	1
0·14 mg.	6	4	2
0·15 mg.	4	2	2
0·16 mg.	4	3	1
0·17 mg.	3	3	0
0·18 mg.	4	3	1
0·19 mg.	2	1	1
0·20 mg.	4	4	0
0·21 mg.	2	1	1
0·23 mg.	1	1	0
0·25 mg.	1	1	0
0·27 mg.	1	1	0

Sixty-six experiments were performed with summer frogs. Thirty-seven frogs received doses of more than 0·1 mg. per gm. body-weight. Of these four survived. Thirty-six experiments were performed with winter frogs. Eighteen received doses of more than 0·1 mg. per gm. body weight. Of these eight recovered. It would thus appear that winter frogs were more resistant than summer frogs. A number of observations were made on frogs which had been more than two months in the laboratory tank. It appeared that the resistance to strychnine was slightly diminished, but the number of experiments was too small to obtain sufficient numerical data to calculate a minimal lethal dose. Experiments 22 to 27 in Table i., represent part of the series with frogs from the laboratory tank, and experiments 24 to 42 represent part of the series with frogs caught in the Botany swamp a few days previous to injection.

The behaviour of *Hyla aurea* after the introduction of strychnine was characteristic when the dose reached a certain value.

As in the European frog, convulsions were first noted when the dose reached about $\frac{1}{6}$ of the minimal lethal dose. With Hyla the smallest dose recorded in the experiments as producing spasms was 0·01 mg. per gm. body-weight. The average figure was 0·015 mg. per gm. body-weight. As the dose was increased the convulsions appeared sooner after the injection of the alkaloid. Table iii. gives the result of such a series.

Table iii.

No.	Weight of frog in gm.	Dose in mg. per gm.	No. of minutes between injection of strychnine and the onset of spasms.
1	19 gm.	0·01 mg.	53 min.
2	—	0·02 mg.	42 min.
3	18·7 gm.	0·05 mg.	10 min.
4	18·4 gm.	0·07 mg.	7 min.
5	17·7 gm.	0·08 mg.	6 min.
6	17·4 gm.	0·09 mg.	6 min.
7	16·7 gm.	0·10 mg.	$4\frac{1}{2}$ min.
8	16·4 gm.	0·11 mg.	4 min.
9	16·2 gm.	0·12 mg.	4 min.
10	16·1 gm.	0·16 mg.	3 min.
11	15·6 gm.	0·18 mg.	$2\frac{1}{2}$ min.
12	15·0 gm.	0·20 mg.	$1\frac{1}{2}$ min.

With a small dose such as 0·01 mg. per gm., the convulsions occurred after 53 minutes. The spasms could be elicited for 30 minutes, and the frog then appeared quite recovered. As the dose increased the duration of the period in which spasms might occur was lengthened. In the determination of the period during which a stimulus produced general convulsions, the frogs were stimulated at first every 15 minutes, later every hour. When the dose was increased to 0·05 mg. per gm. body-weight the frog rapidly passed into a condition of complete paralysis. No stimulus, either thermal, mechanical, or electrical, caused any reflex response, though electrical stimuli caused local contractions. This state of paralysis was always preceded by a period of from 1 to 5 minutes during which spasms might be reflexly produced.

When, however, the dose of strychnine was large, no spasms were noted unless the frog was stimulated at frequent intervals. With doses of 0·1 mg. per gm. and upwards, paralysis was complete in 8 to 3 minutes. When no external stimulation was applied, the frog was noted to gradually sink down until its ventral surface became parallel to the board on which it sat. The fore limbs bent up slowly as if they were unable to support the weight of the body. If at this stage the frog was gently turned on to its back, it made feeble efforts to return to its natural posture. The efforts not infrequently caused a spasm. If the frog was unable to regain the natural position it lay quiet on its back. In a few seconds stimulation would fail to produce any reflex response. The movements of respiration and swallowing ceased, but the heart beat was vigorous. Gradually the heart beat became less, until extreme care was necessary to detect it. In fact on several occasions the decision that a frog was dead was recorded, a decision that had to be altered when the frog subsequently showed signs of life. The period of paralysis endured from three to twenty-nine hours in these experiments. Many frogs which died did not recover from the stage of paralysis. With the majority of frogs, after a number of hours the application of a strong external stimulus brought about a reflex. Soon the threshold value of the stimulus was lowered so that even a slight stimulus produced a wide-spread spasm. In this stage the frog (Hyla) showed an appearance identical with that observed in the typical convulsive stage in Rana. This stage lasted many hours. In one case the spasms endured during 120 hours before the frog died. Two other frogs recovered after the spasms had recurred intermittently for 120 hours. Between the spasms the frog lay in a paralytic condition superficially not unlike that of the initial paralysis.

In order to determine the condition of the frog during the stage of paralysis, certain experiments were made on the excitability of the muscles and nerves of the poisoned frog.

A pithed frog, weighing 16·2 gm., received 1·62 mg. strychnine as sulphate dissolved in 0·33 c.c. salt solution. Four minutes

after the injection of the strychnine into the dorsal lymph sac, the frog exhibited spasms. Four minutes later the frog was completely paralysed. The sciatic nerve was exposed in the thigh by an incision and was placed on electrodes. On stimulating the nerve with single induced shocks or with the faradaic current no contractions of muscles were seen. A standard Du Bois Reymond inductorium and one bichromate cell were employed. The secondary coil was placed directly over the primary coil. On placing the electrodes directly upon the muscles contractions were elicited even when the secondary coil was separated 22 c.m. from the primary coil. Five similar experiments were carried out with exactly similar results. These observations suggested that the strychnine was producing an action upon the receptive substance* between the nerve endings and the muscle fibres. Another experiment was therefore performed. A frog which weighed 17 gm. was taken and the cerebral hemispheres crushed with forceps. The right sciatic nerve was exposed in the thigh and a ligature passed beneath the nerve. The ligature was then tied around all the structures of the thigh except the sciatic nerve. The ligature was placed as near to the knee-joint as possible. The frog then received 1·7 mg. strychnine as sulphate hypodermically into the dorsal lymph sac. After twenty-five minutes nerve-muscle preparations (gastrocnemius-sciatic combination) were made from each leg. On stimulation of the left sciatic nerve there was no response in the gastrocnemius muscle even when the secondary coil was pushed home. With the right sciatic nerve the minimal point of stimulation of the right gastrocnemius muscle for single induced break shocks was with the secondary coil 12 c.m. from the primary coil. Contractions of the left gastrocnemius muscle were first observed with single induced break shocks when the secondary coil was 15 c.m. from the primary coil. A Du Bois Reymond standard inductorium and one bichromate cell were used in these experiments. Repetitions of this experiment yielded like results.

* Langley, Journ. of Physiol. xxxiii., 374, 1905.

It may be concluded that this effect of strychnine is manifested on the receptive substance between the nerve fibres and the muscle fibres. The direct irritability of the muscle fibres is probably unaffected. In other words, from this point of view, Hyla reacts similarly to strychnine and curare.*

Further corroboration of this opinion was obtained by experiments conducted for me in vitro by Messrs. Foy, Schmidt, and Macintosh, students in medicine. For their assistance I wish to express my thanks.

Nerve-muscle preparations were dissected from frogs in pairs and immersed in solutions of strychnine in such a way that the nerve of one preparation and the muscle of the other preparation were suspended in the solution. The stimulus which just caused a contraction when applied to each nerve and each muscle was recorded at appropriate intervals. Faradaic currents were employed from a standard inductorium and one bichromate cell.

The first series consisted of eight experiments with a solution of 1 part of strychnine in 10,000 parts of normal saline solution. About 5 c.c. of this solution were used in each experiment. The abridged results of one such experiment are recorded in Table iv.

TABLE iv.

The figures represent the distance in c.m. between the primary and secondary coils at the minimal response.

Time of immersion.	Muscle in solution of strychnine.		Nerve in solution of strychnine.	
	Muscle in	Nerve out	Muscle out	Nerve in
3 min.	9 c.m.	37 c.m.	18 c.m.	9 c.m.
6 min.	9 c.m.	37 c.m.	18 c.m.	10 c.m.
9 min.	9 c.m.	35 c.m.	16 c.m.	9 c.m.
12 min.	8 c.m.	24 c.m.	—	8 c.m.
15 min.	7 c.m.	no response.	14 c.m.	9 c.m.
30 min.	6 c.m.	no response.	17 c.m.	9 c.m.
57 min.	5 c.m.	no response.	14 c.m.	10 c,m.
72 min.	6 c.m.	no response.	13 c.m.	12 c.m.

* In recent practical classes, strychnine replaced curare in the repetition of Claude Bernard's experiment on muscle-irritability.

From this Table it appears that the muscle immersed in strychnine retained its excitability until the end of the observation (72 minutes), although after 12 minutes the muscle could no longer be stimulated through the nerve. When the nerve was immersed in the solution, little change in excitability was noticeable even after 72 minutes. The seven other experiments showed concordant results with the one recorded. The muscle immersed in the solution of strychnine ceased to be excited through the nerve in 11, 15, 27, 26, 21, 51 and 53 minutes respectively.

A second series was carried out with a solution of 1 part of strychnine as sulphate in 1000 parts of normal saline solution. Nine experiments were performed. Results were obtained similar to those with a 1 in 10,000 solution of strychnine. After a varying interval the muscle immersed in the poison ceased to be excitable through the nerve. This point was reached in 36, 42, 42, 30, 18, 24, 28, 18 and 21 minutes respectively. It is noteworthy that increase in the concentration of strychnine ten-fold did not diminish the period in which the receptive substance of the muscle was paralysed. If these results are compared with those observed in the living entire frog it is noted that, with doses greater than 0·05 mg. per gm. body-weight, paralysis results in less than 15 minutes. In other words, with a possible concentration of 1 in 20,000 in the tissues the receptive substance is rendered inexcitable through the nerve-endings. With possible concentrations of 1 in 10,000 and 1 in 5,000 the paralysis is complete in 5 minutes. The absorption of a considerable quantity of strychnine is probably a matter of hours. As yet no measurements have been made concerning the rate at which the strychnine leaves the dorsal lymph sac. It is, however, evident that a very much lower concentration than 1 in 20,000 in the tissues is adequate when brought in efficient contact with the receptive substance by means of extra-capillary lymph, to paralyse the receptive substance, or that the receptive substance possesses an affinity for strychnine whereby the concentration of strychnine in the receptive substance is raised above that in the remainder of the tissues.

Summary.—The minimal lethal dose of strychnine for *Hyla aurea* is 0·1 mg. per gm. body-weight. The lethal dose is somewhat higher in those frogs gathered in winter than in those gathered in summer. The lethal dose is unaffected by the sex of the frog.

The receptive substance of the muscles of *Hyla aurea* is sensitive to strychnine, so that the frogs show with appropriate doses typical curare-paralysis. The prominence of this action produces a characteristic type of poisoning in Hyla.

In conclusion I would express my thanks to Professor Anderson Stuart in whose laboratory this research was undertaken.

NOTES FROM THE BOTANIC GARDENS, SYDNEY

No. 13.

By J. H. Maiden and E. Betche.

DILLENIACEÆ.

Hibbertia fasciculata R.Br. var. clavata, n.var.

Ranges on the banks of Bylong Creek, Goulburn River (R. T. Baker; November, 1892).

Apparently an erect shrub of more than one or perhaps more than two feet in height, nearly glabrous. Leaves much fascicled, the longest exceeding half an inch in length, all slightly and rather abruptly broadened at the apex and occasionally slightly bilobed.

This new variety is sharply distinguished from the type by the spathulate or clavate leaves. As in the type, the leaves are more or less concave with incurved margins; in the narrow-leaved normal forms this is only apparent on close inspection under a lens, but the broad apex in our new variety makes it very apparent. The leaves are occasionally completely doubled up, so that the term clavate appears more appropriate than that of spathulate.

We have to thank Mr. Baker for permission to describe the specimen collected by him.

MENISPERMACEÆ.

Tinospora smilacina Benth.

Acacia Creek, Macpherson Range (J. L. Boorman; February 1905). New for New South Wales.

Previously recorded from Queensland and North Australia. We have to thank Dr. L. Diels, of Berlin, for confirming our

determination. Mr. Boorman's specimens are in fruit only, and the leaves are so considerably smaller and of thinner texture than the North Australian specimens in the Sydney Herbarium that we doubted whether the Acacia Creek specimens did not rather belong to an undescribed species. The only localities Mr. Bailey gives in his 'Queensland Flora' are "Cape York" and "Thursday Island"; but a plant growing in New South Wales, on the Queensland border, is likely to be found also in dense brush extending up to Brisbane, and has been probably overlooked by Queensland collectors.

TILIACEÆ.

Elæocarpus Baeuerlenii Maiden & Baker.

We published in these Proceedings for 1898 (xxiii., 772) a note on the synonymy of *E. Bäuerlenii* and pointed out that *E. longifolius* C. Moore, had priority.

We find now, in the 'Index Kewensis' (a work not published in 1898), that there is an *E. longifolius* Blume, from Java, and another from Burma similarly named by Wallace. Being earlier than Moore's name, Moore's name must fall, and *E. Bäuerlenii* Maiden & Baker stands.

SAPINDACEÆ.

Cupania (Cupaniopsis) Dunnii, n.sp.

Acacia Creek, in montibus Macpherson Range (W. Dunn; September mensis MDCCCCV florens; November mensis MDCCCCVII fructum ferens).

Arbor fruticosa, circiter quadraginta pedes alta, glabra in omnibus ejus partibus. Folia cum duobus oblongo-lanceolatis obtusis foliolis $2\frac{1}{2}$-$3\frac{1}{2}$″ longa. Flores pauci, in brevibus et axillaribus v. terminalibus paniculis ut videtur dioicis. Sepala imbricata, orbicularia, nonnihil ciliata plus 1‴ per medium. Petala brevibus unguibus, angustiora quam sepala et minime lata, intrinsecus duobus auriculis inflexis coloris aurei ad fundum laminae, unguis et margo inferior ciliati. Petala in pistillatis

floribus absunt. Stamina 7-8, breviter inserta, filamenta ciliata. Discus capillaris. Ovarium triloculatum, uno ovulo in singula cella. Capsula tribus angulis obtusis, prope aequa ad apicem, aperiens loculicide, glabra in parte exteriore et intus. Semina ovata, crasso arillo formato simili poculo ad fundum.

A bushy handsome glabrous tree about 40 feet high with a stem-diameter of about 18 inches. Leaves with two leaflets on a petiole ½ to ¾ inch long; leaflets oblong-elliptical, obtuse, 2½ to 3½ inches long and about 1½ inches broad, dark and shining on the upper side, paler below. Flowers in axillary or terminal few-flowered panicles not above 2½ inches long in the specimen seen, on short pedicels, unisexual as far as seen, the staminate flowers with a rudimentary ovary, the pistillate ones with only a few or no fertile stamens, and apparently without petals—unless the petals drop off in a very early state. Sepals orbicular with thin slightly and sparingly ciliate edges, otherwise glabrous, imbricate, rather above 1 line in diameter. Petals shortly clawed, somewhat smaller than the sepals, nearly as broad but narrower, on the inner side with two inflexed orange-coloured auricles at the base of the lamina above the claw, the claw and the lower edge ciliate. Stamens 7 to 8, shortly exserted, with ciliate filaments. Disk hairy. Ovarium glabrous, 3-celled, with 1 ovule in each cell. Capsule obtusely 3-angled, nearly flat at the top, opening loculicidally in 3 valves, orange-coloured, glabrous outside and inside, expanding to about 1 inch in diameter when open. Seeds ovate, almost black, with a thick cup-shaped greenish-yellow arillus at the base, not ¼ the size of the seed.

Our new species is allied to *C. anacardioides* A. Rich., or perhaps closer to *C. Wadsworthii* F.v.M., but is so well distinguished from both that we need not point out the distinctions. In general appearance it resembles more *Cupania semiglauca* F.v.M. (*Guioa semiglauca* Radlk.), but the fruits and seeds are very different. According to Prof. Radlkofer's classification of Sapindaceæ, it belongs to the genus *Cupaniopsis*, to which belong three other species from New South Wales, viz., *C. anacardioides*, *C. Wadsworthii* and *C. serrata*.

LEGUMINOSÆ.

ISOTROPIS ATROPURPUREA F.v.M. New for New South Wales.

Bingara (J. L. Boorman; September, 1907); Manilla (G. A. Higgins; October, 1907).

Previously recorded only from South-West and North Australia. Its New South Wales habitat is, as far as known at present, the rocky tableland between the headwaters of the Gwydir and Namoi Rivers, an area roughly estimated at about 80 to 100 miles square. At Bingara it is a dense shrub, 2 or 3 feet high, growing between boulders and in crevices of rocks; near Manilla it grows in gravelly Box and Apple-tree country, about 2 feet high, but attains a height of 6 feet, according to Mr. Higgins, in another locality near Manilla. The distribution of this plant in Australia, so far as we know it at present, is very curious. It grows apparently gregariously, covering acres, but the patches are thousands of miles apart so far as present records go.

BOSSIÆA RHOMBIFOLIA Sieb. var. CONCOLOR, n.var.

Araluen (J. L. Boorman; August, 1907).

The typical *B. rhombifolia*, common in sandy and sandstone country, has yellow flowers with a dark keel; the new variety has flowers entirely yellow. According to the collector's field notes, it grows together with the typical form, but is rarer, much more slender in habit, and the foliage has a more glaucous tint.

AOTUS VILLOSA Sm.

A form with all yellow flowers. Narrabri (J. L. Boorman; August, 1907).

This is a precisely parallel case with the yellow-flowering *Bossiæa* mentioned above. The same unknown influence (perhaps the colour-sense of some particular insect) which caused *Bossiæa rhombifolia* to depart from the usual colour of its flowers, has probably been at work in the yellow form of *Aotus villosa*. Also in *Aotus* both forms are found together in the same locality, and

the form with a dark keel is also more common and more robust in habit.

The discovery of the two forms of *A. villosa* found growing together in Narrabri is of interest in that it settles the doubt about the colour of its flowers. The three New South Wales species of *Aotus*, viz., *A. villosa* Sm., *A. mollis* Benth., and *A. lanigera* A. Cunn., are closely allied, and pass so much into each other that it is impossible to draw sharp lines of distinction between all forms. Bentham draws a sharp distinction between *A. villosa* and *mollis* on the one hand and *A. lanigera* on the other, from the colour of the flowers. According to his Key to the Species of *Aotus*, the two former have yellow flowers with a dark keel, and the latter has all yellow flowers; but we have so often met with forms of *Aotus* with all yellow flowers, which we could not reconcile with *A. lanigera*, that we attached little systematic importance to the colour-character. The Narrabri specimens definitely prove that the flowers of *A. villosa* vary in colour from all yellow to yellow with a dark keel; and to this we may add a third not uncommon form with yellow wings and keel, but a dark zone in the standard. *A. mollis* seems to have always a dark keel, and *A. lanigera* has always entirely yellow flowers.

The three New South Wales species should not be kept up as distinct species; in our opinion, they cannot be separated by a single sharp character; it is all a matter of more or less recurved margins of the leaves, or a more or less dense or loose tomentum, or smaller or larger flowers, etc. We have in the Sydney Herbarium typical specimens of all the three species, and they look certainly distinct enough; but the transition-forms are numerous and some are so accurately intermediate between two species that it seems a matter of caprice to place them with one or the other species.

PULTENÆA CAMBAGEI, n.sp.

Torrington, Deepwater, Nova Anglica (in paludibus, R. H. Cambage; September mensis MDCCCCVII).

Frutex erectus, circiter duos pedes altus, parce ramosus. Rami tenues, fere teretes, ramusculi pubescentes. Folia glabra, alterna,

erecta, angustato-linearia, longa circiter quartam partem unciae, concava. Stipulæ absunt. Flores circiter viginti in capitulo terminali. Bracteolae parvae, lineares, insertae fere sub calyce, sed disjunctae, dense ciliatae albis capillis. Calyx pilosus, circiter sesquilineam longus. Petala flava praeter vexillum nubilum; vexillum circiter altero tanto longior quam calyx est; carina et alae nonnihil breviores. Stamina disjuncta. Ovarium dense pilosum. Fructus non vidimus.

An erect shrub up to 2 feet high, usually single-stemmed, with slender nearly terete branches, the young ones covered with appressed white hairs, the adult ones quite glabrous. Leaves alternate, erect, narrow-linear, about $\frac{1}{4}$ inch long, concave, the upper ones occasionally almost terete and channelled above, the lower ones often broader with less incurved margins, approaching to narrow-lanceolate, obtuse or somewhat acute, glabrous and equally green on both sides, shortly petiolate, without any stipules. Flowers very shortly pedunculate, up to 20 together in terminal heads within small densely hairy involucral bracts. Bracteoles small, linear, inserted close under the calyx but free from it, densely ciliate with white hairs. Calyx about $1\frac{1}{2}$ lines long, reddish, covered with white hairs, the two upper lobes broader and united higher up. Petals yellow, except the dark-coloured standard, the standard about twice as long as the calyx, keel and wings rather shorter. Stamens all free. Ovary densely hairy, with a short style hooked at the top. Fruits not seen.

We have little doubt that this species is correctly placed with *Pultenæa*, but still the question whether it should not rather be referred to *Phyllota* may be left open until ripe seeds are obtained. The two genera are distinguished by the following characters :—

Phyllota.—Stipules usually absent, rarely minute. Stamens more or less united at the base with the petals or to each other. Seeds without strophiole.

Pultenæa.—Stipules usually conspicuous, rarely absent. Stamens free. Seeds strophiolate.

The stamens are quite free in *Pultenæa Cambagei*, therefore it should be placed with *Pultenæa* in spite of the absence of the stipules. If the seeds turn out to be strophiolate, its position in the genus *Pultenæa* is confirmed; but even if the seeds should turn out to be without a strophiole, it might be placed with equal reasons with *Pultenæa* as with *Phyllota*. The two genera pass into each other, and our new species is more or less a connecting link. Its nearest natural affinity seems to be with *P. subumbellata* Hook., which has the same inflorescence, similar flowers and no stipules, but has different leaves and a different habit. According to Bentham's classification in the 'Flora Australiensis,' in which more stress is laid on the shape of the leaves, it should be placed next to *P. echinula* Sieb., from which it is readily distinguished by the smooth leaves without stipules. It is also allied to the Tasmanian *P. diffusa* Hook. f., which F. v. Mueller removed to *Phyllota* in spite of the free stamens; but our species has a terminal inflorescence, and *P. diffusa* has the flowers in the axils of the upper leaves as usual in *Phyllota*. In spite of its various affinities, *P. Cambagei* is a well-marked species, impossible to unite with any described species, either of *Pultenæa* or *Phyllota*.

PULTENÆA CINERASCENS Maiden and Betche, these Proceedings, xxx. 361(1905).

Narrabri (J. L. Boorman; August, 1907).

The species was described by us two years ago, from specimens collected at Warialda and Coolotai (25 miles to the north), on the other side of the Nandewar Ranges from Narrabri.

In addition to this new locality, we have to record two other Pultenæas collected by Mr. R. H. Cambage (Gilgandra, October, 1904; and Scone, August, 1907) which we can regard only as connecting links between *P. cinerascens* and *P. microphylla* Sieb. The typical forms of the two species are so distinct that nobody would think of uniting them; but the difference is chiefly in habit and leaves, with hardly a marked difference in the flowers and

inflorescence. *P. cinerascens* is an erect shrub with clustered, linear, rather acute leaves; and *P. microphylla* is a diffuse shrub, with scattered, more or less cuneate leaves. Mr. Cambage describes his Scone specimens as from a small shrub about 2 feet high, erect, but with a somewhat spreading head. This plant has also a somewhat cinerascent appearance like the true *P. cinerascens*, but the leaves are not clustered, and are more like some of the forms of *P. microphylla*. The Gilgandra specimen is like the Scone specimen, but without the silvery hairs, and therefore nearer to *P. microphylla*.

These numerous intermediate forms in nearly all of the larger and in many of the smaller genera constitute a great difficulty with which Australian botanists have to contend. Of course it is well understood at the present day that all species developed gradually from a common ancestor, and that connecting links are therefore to be expected, unless they have died out; but it seems probable that no flora on earth is in such an unsettled state as the Australian flora. If we were to unite all species between which intermediate forms can be found, we should have to unite *Boronia mollis* and *Fraseri* with *B. ledifolia*; and to reduce such genera as *Leptospermum*, *Callistemon*, *Stipa*, *Aristida*, and many others to very few species; but this is neither practicable nor expedient, and we must draw arbitrary lines.

In view of this unsettled state of the flora, some of the excellent recent monographic works published in Engler's 'Pflanzenreich' are rather bewildering to Australian botanists, in the number of new species described. For instance, the numerous new species of Australian *Haloragis* may be well enough defined in the herbaria of Berlin and Vienna; but they are very bewildering to the botanist working in the field, who meets with the numerous transition-forms which he can place neither with one nor the other of the described species. Of course even the best settled of the Australian States is imperfectly explored botanically; in fifty years' time the men who come after us will see clearer and solve many of the difficulties which present themselves to us. In doubtful cases we can now only record our difficulties, and honest

and careful expressions of opinion may have value, even if later they prove to be erroneous, since they will help to a better understanding of the flora.

KENNEDYA RETRORSA Hemsl., Bot. Mag. t.8144(1907).

Mount Dangar, Gungal near Merriwa (J. L. Boorman; September, 1904).

The Mt. Dangar specimens were erroneously determined by us as *K. procurrens* Benth., a rare and imperfectly described plant. The error was detected at Kew, where the type-specimens of *K. procurrens* are kept. In these Proceedings(Vol. xxix. 1904, p.738) we published a note on the supposed rediscovery of a rare *Kennedya*, and the plant referred to is that described by Hemsley as a new species.

ACACIA BAUERI Benth.

Wentworth Falls, Blue Mountains (W. Forsyth; January,1907).

A new locality for a rare plant. Previously recorded New South Wales localities are, Port Jackson district, Byron Bay and Richmond River, all coast localities. The phyllodia of the Blue Mountain specimens are irregularly verticillate, and rough with minute asperites.

ACACIA FARNESIANA Willd.

Scone, $\frac{1}{2}$ mile on Aberdeen Road (J. H. Maiden; November, 1907).

Most eastern locality recorded.

MYRTACEÆ.

MELALEUCA HYPERICIFOLIA Sm.

Wentworth Falls, 500 feet down (W. F. Weeks; July, 1906 : W. Forsyth; January, 1907).

An interesting locality for a plant generally known as a coastal species.

COMPOSITÆ.

HELICHRYSUM BRACTEATUM Willd.

Torrington, near Deepwater, in swamps (H. Deane; March, 1907).

A remarkable form with strictly radical leaves, stem-leaves reduced to long linear sessile bracts, crowded under the flower-head.

CONVOLVULACEÆ.

IPOMŒA HETEROPHYLLA R.Br. New for New South Wales.

Moree (J. T. W. Scott; February, 1907).

A species recorded from South Australia, Queensland and North Australia, but not previously collected in New South Wales.

LABIATÆ.

PROSTANTHERA TERETIFOLIA, n.sp.

Torrington, in glabris saxosis graniticis (R. H. Cambage, September mensis MDCCCCVII).

Frutex erectus, tres usque ad quattuor pedes altus, coloris obscure viridis propter squamas tenues et exalbidas quae ramos, folia tenera, calycesque tegunt. Folia lineari-teretia, striata infra, circiter quinque lineas longa. Flores solitarii in axibus foliorum breviter pedicellati, sine bracteis. Calyx vix duas lineas longus, tubus striatus, lobi super fructum interclusi, glaber in parte interiore et exteriore. Corolla indica expandit fere ad partem mediam unciae longitudine. Antherae brevibus adjunctis ad omnes cellas, omnes multo breviores quam cellae et longitudinis aequalis. Fructus non vidimus.

An erect dense shrub of dull green colour, about 3 to 4 feet high, the branches, young leaves and calyces covered with minute thin whitish scales, otherwise glabrous. Leaves linear-terete, grooved on the underside, about 5 lines long, obtuse, shortly petiolate and often appearing clustered from the shortness of the leafy side-shoots on which they are crowded. Flowers shortly pedicellate, solitary in the axils of the leaves, without any bracts. Calyx hardly 2 lines long, the tube striate, the lobes closed over

the fruit, the lower lobe slightly longer and narrower, glabrous inside and outside. Corolla purplish-blue, large, apparently spreading to nearly ½ inch in length when fully out. Anthers with short appendages on each cell, all many times shorter than the cells and of equal length. Style long. Ripe nuts not seen.

This new species belongs to Bentham's Series Convexæ of Section Euprostanthera. It should be placed in the system next to *P. empetrifolia* Sieb.; but it is really not closely allied to any described species, and is readily distinguished by the characters given above. The leaves are not "terete" in the strict meaning of the word, but they appear so at first sight, and approach nearer to terete than in any other species of the genus.

URTICACEÆ.

For Ficus stenocarpa Warb., these Proceedings, xxxi. 738 (1906), read Ficus stephanocarpa.

CYPERACEÆ.

Kyllingia triceps Rottb. New for New South Wales.

Port Jackson district (J. L. Boorman; April, 1907).

We have to thank Mr. S. Kneucker, the editor of the Cyperaceæ exsiccatæ, for the determination of this species. It is common in the Port Jackson district, but is probably mixed up also in other herbaria with *K. monocephala* Rottb., and *K. cylindrica* Nees. Herr E. Palla writes on the printed labels issued with Kneucker's exsiccatæ :—"Those species of Kyllingia whose headlets are whitish are frequently mixed up with each other. *K. monocephala* is distinguished from all others by the winged keel of the glumes, and also by the white anthers, a character I have never seen mentioned in the literature of this species; the anthers of all other species are yellow. *K. triceps* is distinguished from its nearest ally, *K. cylindrica* Nees, by the fruit which is from elliptical to narrow-elliptical in *K. triceps*, and nearly or quite orbicular in *K. cylindrica*."

From these notes we revised our species of Kyllingia and found *K. triceps* quite common in the Port Jackson district; but all

other specimens in the Herbarium are from Queensland stations. Palla's description of *K. monocephala* as having a "winged keel" seems not to be a happy one; Bentham describes the glumes as "acutely keeled," an expression that seems to us much more applicable; in none of our specimens is the keel so acute that we should call it "winged," and we find the character by no means a sharp one.

Bentham describes the nuts of *K. cylindrica* as "very dark" and those of *K. triceps* as "pale." Palla ignores the colour of the nuts, and it seems to us the colour depends solely on the degree of ripeness of the nuts; we have found pale and dark nuts in both species.

Scirpus sterilis, n.sp.

Narrabri Occidentalis in sterili arenosâ terrâ (J. L. Boorman; menses Junius et September MDCCCCVII).

Planta annua caespitosa caulibus gracillibus, teretibus, costatis, sex usque ad octo uncias altis. Folia plerumque duo ad fundum caulis, lamina lineari-tereti minus duas uncias longa, et vagina brevi, striata simile cauli. Spiculae numerosae, saepe plus triginta, in racemo terminali qui circiter partem mediam unciae per medium occupat, bracteis foralium parvis et subulatis, plerumque in racemo celatis. Spiculae mutabilissimae, longissimae, circiter quinque lineas longae, duodecim floribus. Bracteae florentes subfuscae, carina crassa coloris pallidioris et lateribus nervis carentibus. Setae hypogynae absunt. Unum stamen solum. Stylus tribus ramis. Caryopses maturae subfuscae, tribus angulis, læves; caryopses steriles albae, circiter dimidio minae quam caryopses fertiles.

A densely tufted annual, with slender terete ribbed stems, 6 to 8 inches high when full grown, interspersed with shorter stems. Leaves generally two at the base of the stem; the lamina linear-terete, the longest seen under 2 inches long, minutely denticulate with small asperities only visible under a lens, the sheath striate like the stem and generally much under 1 inch long. Spikelets numerous in a terminal cluster, the longest heads about $\frac{1}{2}$ inch

in diameter with more than 30 spikelets, the involucral bracts small and subulate, shorter than the matured heads and generally concealed in the spikelets. Spikelets variable in length, with from a few to above 12 flowering glumes, the longest about 5 lines long. Flowering glumes pale brown with a thick, lighter-coloured keel terminating in a short straight or slightly recurved point, the keel smooth but occasionally very slightly denticulate, the sides nerveless. No hypogynous bristles. Stamens 1 only in all spikelets examined. Style-branches 3. Mature nuts pale brown, three-angled, smooth; sterile nuts white, empty except for a shrivelled-up ovule, about one-half the size of the fertile nuts.

The species is not closely allied to any Australian *Scirpus* described in the 'Flora Australiensis'; its position in the system is near *S. inundatus* Spreng. The most characteristic feature in the new species is the numerous sterile nuts. In Mr. Boorman's specimens, collected in June, we found only sterile nuts; but when he returned in August to the locality and brought large quantities of specimens, we found a few solid fertile nuts. The numerous unfertilised nuts may be caused by local circumstances, and the specimens may be abnormal.

SCIRPUS CERNUUS Vahl, var. AUSTRALIENSIS, n.var.

Cobham Lake (W. Bäuerlen; September, 1887).

A small annual with setaceous stems 1 to 3 inches high. Leaves very short, hardly longer than the sheath. Spikelets terminal, single or more generally in pairs, hardly above 1 line long. Involucral bract generally solitary, about $\frac{1}{4}$ of an inch long, spreading or continuing the stem so that the terminal spikelets appear lateral, occasionally with a second short bract. Glumes light-coloured, not numerous, ovate, rather acute, with a broad keel and veinless almost transparent sides. No hypogynous bristles. Stamens solitary in the few spikelets we could examine. Style-branches 3. Nut ovoid, about one-half as long as the glume, 3-angled, smooth on the sides.

So many botanists have examined this plant, and we have made use of their observations, that we can only technically claim to be the authors of the variety.

When Mr. Bäuerlen collected the specimen 20 years ago, it was sent for determination to Baron von Mueller who regarded it as a new species, and gave it an MS. name, but never published a description, though he briefly described it in the Melbourne Herbarium. The late Mr. Luehmann sent us a copy of the following original description by Mueller, but mispelled in part, and past full recognition of his meaning—"Culmis 3-8 cm. longis, capillaceis, monocephalis; spiculis 2-1 bracteatis, 4 mm. longis; glumis ovatis, subacutis, acute carinatis, teneris, minute acantala [?], leve straminea aut brunescente."

"*S. cartilagineus* Benth., Fl. Austr. Vol.7, p.328, partim.

S. inundatus Benth., Fl. Austr. Vol.7, p.329, partim.

W. Australia: Swan River, Drummond.

Victoria: Murray River, F.v.M.; Bugle Range, F.v.M.

N. S. Wales: Cobham Lakes, W. Bäuerlen."

The mark of interrogation at the word acantala is ours; though we have not seen the original label, Mr. Luehmann insisted that the word is a correct copy.

The Baron's MS. name cannot be maintained, as there are already three other species with the same name in the 'Index Kewensis,' though all are synonyms; and it is not advisable to add a fourth to the number.

In 1902 Mr. R. T. Baker sent specimens to Kew for determination. Mr. C. B. Clarke, the well-known authority on Cyperaceæ, declined to describe it, but he kindly gave his advice that it might be regarded as a form of *S. cernuus* Vahl, a cosmopolitan species, from which it differs only in trifling points, as its very small nut and apiculate glume; though, on the other hand, so many species of *Scirpus* have been described on trifling differences that it might be described as a new species without inviting adverse criticism.

Mr. Baker kindly placed the correspondence and the plant at our disposal. Mr. C. B. Clarke came to the same conclusion as F. v. Mueller, though he had not seen his MS. description, that Bentham included the plant under *S. cartilagineus* and under *S. inundatus*, though it will not match either.

Scirpus Kochii, n.sp.

Cowcowing, Australia Occidentalis (Max Koch; September mensis MDCCCCIV).

Planta annua caespitosa caulibus fere filiformibus et costatis, maxima altitudo sex unciæ. Folia setacea, brevissima, vagina brevis et coloris badii. Spiculae sesquilineam usque ad plus quam duas lineas longae, plerumque tres usque ad quinque in racemo terminali. Bractea foralium plerumque una sola, quae expandit vel erecta est, et variat a breviore quam spiculae usque ad fere unam unciam longa. Bracteae florigerae irregulariter in quinque ordinibus ordinatae, fere ovatae, carina firma et fusca continuata in acumine brevi et recto vel curvatiore, latera pallida, pellucida, omnino nervis carentes, sigillatim rugosa. Setae hypogynae absunt. Stamina non vidimus. Stylus tribus ramis. Caryopsis ovata, lævis, tribus angulis distinctis coloris schistacei, circiter tertia pars tam longae quam bracteae florigerae.

A small tufted annual at the most 6 inches high, with slender almost filiform ribbed stems and shorter setaceous leaves; the short sheath at the base of the stems reddish-brown. Spikelets $1\frac{1}{2}$ to above 2 lines long, generally 3 to 5 together in a terminal cluster. Involucral bracts mostly 1 only, spreading or erect, generally somewhat longer than the cluster of spikelets, but occasionally shorter, or nearly 1 inch long. Glumes numerous, irregularly arranged in five rows, almost ovoid, strongly keeled, the brownish keel produced into a short straight or slightly recurved point, the sides pale and quite nerveless, transparent, minutely rugose. No hypogynous bristles. Stamens not seen. Style-branches 3. Nut ovoid, smooth, prominently 3-angled, about $\frac{1}{3}$ as long as the glumes, of a pale slate colour.

This graceful *Scirpus* is nearly allied to *S. cartilagineus*, but the small nuts and the transparent glumes without any side-nerves distinguish it sufficiently from this species and all its forms.

Rhynchospora aurea Vahl. New for New South Wales.

Connungra, near Mt. Lindsay (J. L. Boorman; March, 1904).

A common tropical plant spread over the warmer regions of the whole globe. In East Australia it was previously recorded as far south as Brisbane. Our New South Wales locality brings it some 50 miles further south.

GRAMINEÆ.

ANDROPOGON BREVIFOLIUS Swartz (*A. fragilis* R.Br.). New for New South Wales.

Narrabri West (J. L. Boorman; June, 1907).

Recorded previously from Queensland and North Australia, not further south than the Endeavour River. The Narrabri specimens agree exactly with R. Brown's type-specimens from the Endeavour River. R. Brown described it erroneously as a new species, but it is now recognised to be identical with *A. brevifolius*, common in India and distributed over the tropics of the globe.

POA COMPRESSA Linn. New for Australia.

Blackheath, Blue Mountains (W. Forsyth; January, 1907).

This is a grass from the temperate Northern Hemisphere, not previously recorded from the Southern Hemisphere so far as we know. In appearance it is much like a starved specimen of *P. saxicola* R.Br. We have to thank Prof. E. Hackel (through Prof. A. J. Ewart) for the determination.

CONTRIBUTION TO OUR KNOWLEDGE OF AUSTRALIAN *HIRUDINEA*.

Part i.

By E. J. Goddard, B.A., B.Sc., Junior Demonstrator in Biology, Sydney University.

Introduction.—The freshwater Rhynchobdellidæ of New South Wales, in fact the Hirudinea of Australia generally, have so far been neglected. Although search proves that the Hirudinea are well represented in Australia, the only account of any of these for a number of years is that given by Miss Lambert in connection with the Land Leech *Philæmon pungens* in 1897. The small size of the animals and their conditions of life no doubt in some way account for the neglect which they have suffered, inasmuch as they would not be readily recognised as "Leeches" by any one not interested in our freshwater fauna, and hence they would not enjoy the prominence bestowed on the common Leech, *Hirudo quinquestriata.*

The field is sufficiently fruitful to warrant successful investigations.

The present paper deals with some Leeches belonging to the family *Glossiphoniidæ*, two species being members of the type genus, *Glossiphonia* (syn. *Clepsine*), the third specimen described constituting a new genus.

As the group is a very interesting one from several standpoints, I resolved, in taking advantage of Dr. Hill's kindness in giving me some fine specimens which he had collected, to attempt some work on the group.

I would here express my great indebtedness to Professor Haswell for placing at my disposal any literature which he possessed, and for his kind encouragement in every way.

I would also take this opportunity of expressing my thanks to Dr. Hill for his kindness in placing the specimens at my disposal.

Methods.—Corrosive sublimate proved an excellent fixative with these specimens, and I find that Castle advises the use of that reagent in fixing Glossiphonids. Specimens fixed in Zenker's fluid show a certain amount of distortion as regards the cellular elements. Entire specimens cleared in cedar oil gave me much help preliminarily in the study of the gross anatomy of the digestive system.

Castle* recommends iron-hæmatoxylin as the best stain for sections; and I found sections so stained to outclass those stained with other reagents. The strongly developed musculature offers good material for a counter stain with eosin.

The specimens were imbedded in paraffin by the benzole method after having been cleared in cedar oil, and good results were thus obtained.

The genus *Glossiphonia* (*Clepsine*) is well represented as regards species in North America and Europe, where much work and attention have been given to them by Whitman, Castle, Apathy, Grube, Mueller, Oka and others.

In 1900 Dendy and Olliver described what was regarded as a biannulate species of *Glossiphonia* from New Zealand, but later it was found to be a species of *Microbdella* Moore.

The species of *Glossiphonia* described in this paper constitute, I believe, the first record of the genus from Australia. Lately I have obtained other species from Tasmania and the mainland, so that the species is a really very widely distributed form.

Glossiphonia is characterised among the Glossiphonid Rhynchobdellidæ by the triannulate nature of the somite and broad flat body which is rolled into a ball when disturbed after the

* Bull. Mus. of Comp. Zool. Harvard Coll. Vol.xxxvi. p.18.

fashion of Oniscus. The young are carried about attached to the concave ventral surface of the adult, this surface acting as a marsupium or brood pouch. The individuals occur in ponds and slowly moving fresh water, under stones, beneath the bark of submerged and floating timber, and parasitic on molluscs, etc.

Glossiphonia australiensis, sp.nov.

This species was obtained by Dr. Hill in a creek near Oberon, N. S. W. The species is of much interest from a phylogenetic standpoint, and well deserves a specific name indicative of its locality of occurrence.

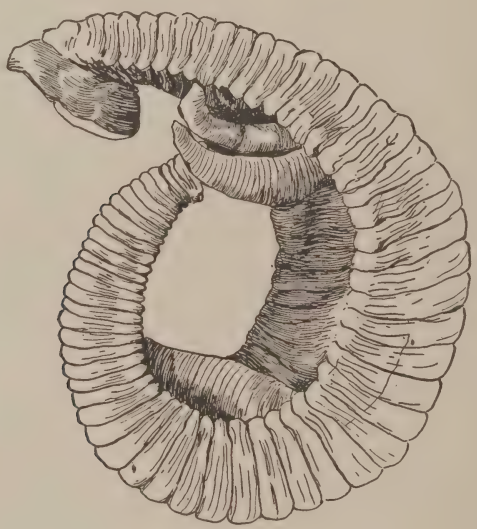


Fig. 1.—*Glossiphonia australiensis*, sp.n.

Internal view showing three young ones attached to the concave ventral surface. The number of annuli can be easily made out, and the anus seen between the ultimate and penultimate rings. Note also the roughness of the surface. (Drawn from a photograph).

External characters.—The body resembles in its general form that of most other species of the genus. It is broadest about the

middle of its length, tapering towards the anterior and posterior ends. The anterior extremity is slightly wider than the "neck" in the preserved specimens, but this may be due to contraction.

The length of adult individuals when fully extended is about 15 mm.; in a state of contraction about 10 mm. The width in the middle region of the body is about 5 mm.

The body in a state of contraction is concavo-convex in section. The surface is rough and devoid of papillæ when viewed macroscopically. In section, however, the skin is seen to be covered by a large number of papillæ due to outpushings of the cuticle with the underlying epidermis and subepidermis.

I am not in a position to say whether these papillæ are innervated or not, or whether they are of any segmental significance in connection with somite-limits.

Unfortunately as I have been unable to procure living specimens I cannot make any detailed remarks concerning the colour and pattern-ornamentation of the species. The preserved specimens were of a flesh colour, and Dr. Hill informed me that they differed in no way from the living specimens as regards colouration. The body is quite opaque, and this feature prevented me in the first place from regarding the species as *Glossiphonia heteroclita*, which it closely resembles in other features, unique among which is that of closely approximated genital apertures which in *G. heteroclita* are said to be actually united.

The annuli are distinct and well marked off from one another. The total number is seventy, sixty-three of them lying behind the anterior sucker. The annuli are of greatest extent in the middle region of the body, gradually diminishing in size as they approach the anterior and posterior regions of the body.

As in all species of *Glossiphonia*, the total number of somites is thirty-four. This I have determined in the species under description by making a count of the number of nerve-capsules The first, second, and third somites are uniannulate, the fourth biannulate, and most of the others triannulate.

Eyes six in number; the first pair, which are situated on the second annulus, being much smaller and closer together than the

second and third pairs. The second and third pairs of eyes are situated on the third and fourth annuli respectively. They are large in size and the members of each pair widely separated. The second and third eyes on each side are closely approximated. The anterior pair are directed forwards and toward the side of the body; the second pair toward the side and slightly backward; the posterior towards the posterior region of the body.

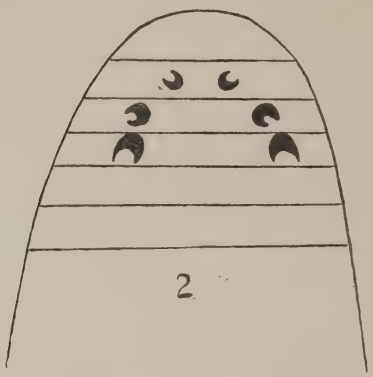


Fig. 2.—*Glossiphonia australiensis*, sp.n. Anterior end, showing the position of the eyes.

The anterior sucker is constituted by seven annuli. The anus is situated on the dorsal surface between the penultimate and ultimate annuli.

Genital apertures.—When first examining the species I was inclined to regard the genital apertures as united. This condition obtains in *Glossiphonia heteroclita*, which is unique in that respect among species of *Glossiphonia*. On making a closer examination with the aid of sections, I found that the apertures were distinct but separated by a single annulus—the twenty-ninth—which is much diminished in importance. The two apertures open into a depression with tumid lips which lies behind a small clitellum-like swelling on the ventral surface, between the twenty-eighth and thirtieth annuli. Probably one would be enabled to see these separate apertures if an examination were made of a perfectly extended organism.

The male aperture, then, lies between the twenty-eighth and twenty-ninth annuli, the female aperture between the twenty-ninth and thirtieth. From a study of transverse sections one might readily fall into the error of describing the genital apertures as united, to such an extent has the twenty-ninth annulus been diminished on the ventral surface.

In describing the position of the genital apertures in *Glossiphonia heteroclita*, Blanchard says, "Porus genitalis masculus inter annulos 25-26, vulva inter annulos 27-28 hians."

Castle, in his carefully written account of the Fresh Water Rhynchobdellidæ of North America, says "Blanchard is certainly in error in his description of the position of the genital apertures," and points out that there is a single united aperture situated between the twenty-eighth and twenty-ninth annuli.

Body-wall and body-substance.—Much has been written on this subject. Bourne has given an excellent description in a comparative way of the important genera of the Hirudinea. I do not hope to add any great amount of information to Bourne's account, but intend to furnish some notes of specific character which may be of some use in connection with that already published.

The body-wall consists of five layers—cuticle, epidermis, dermis, circular muscle fibres, longitudinal muscle fibres.

The cuticle calls for no special remark beyond that it is produced into a great number of microscopic papillæ into which rise corresponding projections of the epidermis and dermis. No nerve connections could be made out, but they possibly may have some tactile or sensory function, or again may be due to the state of contraction of the organism.

The epidermis consists of a single layer of columnar cells with a fairly large nucleus. Some of the cells are enormously enlarged to form large pear-shaped glands which are sunken to a great depth from the main epidermal layer so as to lie on the external surface of the circular muscle mass which lies beneath the dermis and imbedded in the dermis. The glands contain a finely granular substance which, like the glandular cells themselves, takes an intense stain with hæmatoxylin. The glands are much more abundant in connection with the dorsal than with the ventral surfaces. In the dorsal and the latero-ventral regions one makes out clearly two distinct tiers of epidermal glands, one tier being deeply seated, the other more superficially situated and consisting of much smaller elements

than the former. In the region of the clitellar swelling, which lies in front of the genital apertures, the glands are absent, and we find the same condition for some distance on either side of this swelling.

The dermis is of considerable thickness, and consists of a matrix in which occur numerous cells with a large nucleus, and also diagonal muscle fibres. These fibres are, according to Bourne, absent in the species which he examined. The cells mentioned above as occurring in the matrix constitute the "excretophores" of other species of *Glossiphonia*.

The circular muscle fibres form a layer equal in thickness to the combined epidermis and dermis.

The longitudinal muscle fibres are arranged in masses beneath the circular fibres, the groups being separated from each other by dorsi-ventrally directed fibres. These longitudinal fibres show very distinctly, in their cortical position, the striations seen in the other members of the Hirudinea.

The body-substance consists of a vacuolated mass, scattered in which are the complex series of sinuses, various kinds of corpuscular cells, and the salivary glands.

The salivary glands far exceed in size any other cellular elements in the body, with the exception of the ova. In sections they appear as chains of large oval or spherical cells deeply stained. They extend in each side of the body from the anterior limits of the ventral nerve cord to the posterior extremity of the ovaries, and thus form very conspicuous elements.

Fat cells are abundantly distributed through the body, inasmuch as abundant cellular elements occur containing a nucleus and very scant cytoplasm.

Graf has attributed to the "excretophores" an excretory function, thinking that they take up excretory products in the deeper portions of the body and then travel towards the surface of the body and disintegrate. With this belief I am in accord. The great abundance of these cells and the great diminution in the development of the nephridia in *Glossiphonia australiensis* incline me to think that the "excretophores" have the function

of excretion dependent upon them. They occur abundantly in close connection with the blood sinuses, which perhaps is of further significance.

Connecting the ventral and dorsal body walls are masses of dorsi-ventral muscle fibres. In the posterior region behind the stomach these muscles are more obliquely arranged, and constitute the bulk of the body substance.

One can differentiate between a group which runs on either side of the pharynx, and others more laterally situated. Those situated on either side of the pharynx in places form the lateral boundaries of the ventral lacuna; in other regions they divide that lacuna into median and lateral divisions. In effecting this division they do not form continuous sheets, but occur as bundles, an arrangement which may be of metameric significance.

Sinuses and coelome.—Possibly no Leech presents more interest than *Glossiphonia* in the study of the coelome and its remains. That the sinuses represent the remains of a coelome, is prettily borne out by the occurrence in these channels of large nucleated cells which in every probability represent the remains of a coelomic epithelium, as pointed out by Bourne. These elements do not occur in the vessels, and thus additional weight is given to this argument.

The details of the system of sinuses agree very closely with those of other species, and call for no special remark, owing to Oka's work in that connection.

Digestive canal.—The mouth is situated in the anterior portion of the oral sucker, and lies in the third somite of the body, which is the position most common in other species. The mouth leads dorsally into the pharyngeal sac. The wall of this sac is folded and its lumen circular in cross-section. The anterior region of the sac runs from the mouth to the central portion of the central portion of the body-substance, and thence extends backward through the brain-mass.

The proboscis lies within the pharyngeal sac, and extends through the greater part of its extent, occupying the area of about twenty annuli. The posterior region of the proboscis

becomes attached to the wall of the pharyngeal sac which surrounds the whole of the proboscis except a small part at the posterior extremity, occupying about two annuli.

The wall of the pharyngeal sac consists of a layer of flattened epithelial cells which are found to be continuous with the epidermis of the body. It is quite devoid of the glandular elements which occur as modified epidermal cells in the body-wall.

The wall of the proboscis comprises five distinct elements :—

(1) *Pharyngeal epithelium*, consisting of a single layer of minute flattened cells.

(2) *Radial muscles*, occupying a great portion of the pharyngeal wall which passes out between the circular muscle elements, and then becoming dilated to abut on the epithelium of the external surface of the proboscis.

(3) *Circular muscles*, forming three crescentic masses lying, together with the radial muscles, in the triangular areas formed by the contour of the inner wall of the proboscis.

(4) *Longitudinal muscles*, occurring as bundles scattered among the outer portions of the radial muscles, which occupy the greater part of the region in which the longitudinal muscles occur.

(5) *External epithelium*, consisting of flattened cells, continuous at the posterior end of the pharyngeal sac with its wall, and so representing portion of a modified epidermis.

The proboscis leads posteriorly into the œsophagus. When the proboscis is retracted, the œsophagus appears as a tube running parallel and dorsally to it, and extending through about eleven annuli. Its wall is very much folded, and quite different in character from that of the proboscis and crop. The internal lining layer consists of cells which take a vivid blue stain with hæmatoxylin. This layer is very much folded, reminding one of the general appearance of the pharyngeal sac when the proboscis is retracted. The folding of the layer is due to the contraction of the œsophageal muscles when the proboscis is withdrawn. The muscles of the wall of this portion of the digestive system consist of circular muscle fibres immediately external to the

lining epithelium, and an outer mass of longitudinal muscle fibres. The main differences in the constitution of the walls of the proboscis and œsophagus are—(1) There is an abundant radial musculature in the wall of the proboscis. (2) The longitudinal muscle fibres are arranged less compactly in the proboscis than in the œsophagus. (3) The lining epithelium of the proboscis is less definitely developed than in the case of the œsophagus.

The crop is a thin-walled sac extending backwards from the œsophagus as far as the fiftieth annulus. It lies close to the dorsal body-wall owing to the enormously developed ventral median lacuna in this region. It gives origin to six pairs of diverticula, as is the case in *Glossiphonia heteroclita*. In the young individuals found attached to the adult and evidently about to become free, only five such diverticula are present, the sixth pair being developed later anterior to these five. This last-developed pair of diverticula is quite permanent in character, and not merely due to a temporary dilatation of the crop, as is found to be the case in some species. Each cæcum is connected with the crop by a slender passage in the adult, but in young individuals no well marked connecting passage can be discerned, as distinct

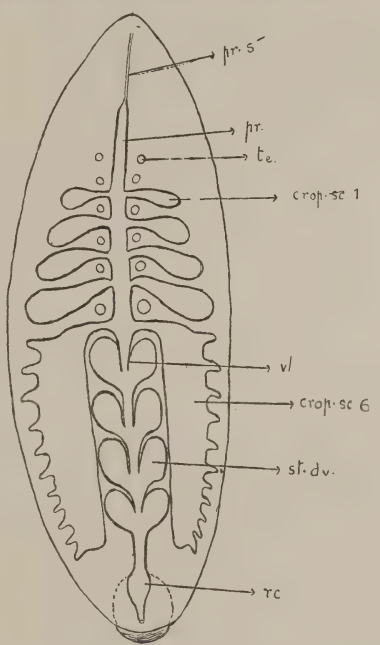


Fig.3—*Glossiphonia australiensis*, sp.n.*

* Fig.3.—*Glossiphonia australiensis*, sp.n. Young individual showing the digestive system, and the position of the six pairs of testes.

pr.s., proboscis sac—*pr.*, proboscis—*te.*, testis—*crop sc. 1*, second pair of crop cæca of adult—*vl.*, valve between crop and stomach—*crop sc. 6*, last pair of crop cæca—*st. dv.*, stomach diverticulum—*rc.*, rectum.

from the main portion of the pouch. The cæca are directed towards the ventro-lateral region of the body. They increase in size and importance as they approach the posterior end of the body, the smallest pair being most anterior, the largest most posterior. The first five pairs are simple in outline, but the sixth pair gives rise to a great number of secondary cæca, and extend on either side of the stomach from the forty-fourth to the sixtieth annuli. The walls of the crop and cæca consist of a lining epithelium of large columnar cells, with conspicuous spherical nuclei, and an external inconspicuous layer of circular muscle fibres. The structure of the wall is such as would best serve the crop and cæca in the function of storing food material. The longitudinal muscles, so strongly developed in connection with the œsophagus, are not represented in the crop and cæca.

The stomach gives off four pairs of diverticula which are auricular in shape and not elongate as in *Glossiphonia heteroclita*. The contents of the stomach are quite different from those of the crop. Whereas, in the crop, there is present a mass of muscle material, etc., obtained by the carnivorous character of the species, in the stomach there is found a clear mass as the result of digestive changes. The passage of the material from the crop to the stomach is regulated by a valve-like structure situated at the junction of the crop and stomach. The portion of the crop lying behind the point of origin of the last pair of cæca becomes intimately connected with the antero-mesial wall of the first pair of stomach diverticula; and this portion of the united common wall of the stomach and intestine projects into the cavity of the stomach, preventing material from passing forwards from the stomach to the crop, and, at the same time, regulating the passage of food from the crop to the stomach.

The rectum is a pear-shaped chamber opening to the exterior at the anus, which is situated between the sixty-ninth and seventieth annuli.

The epithelial lining of the stomach takes a very deep stain with hæmatoxylin. The cells of this layer are tall and columnar, with a spherical centrally situated nucleus.

Surrounding the diverticula of the stomach and so lying between them and the last pair of crop cæca, is a very strongly developed series of blood-channels. This great development, together with the ultimate connection of the channels with the stomach epithelium, points to the stomach as being functional both in digestion and absorption.

The wall of the intestine consists of a much folded epithelium of columnar cells, external to which are circularly arranged muscle-fibres. The blood-channels previously mentioned in connection with the stomach are not present in the immediate neighbourhood of the intestine, and so probably the rectum is connected solely with the function of egestion.

Reproductive organs.—The species is protandrous. In examining sections of young individuals which were attached to an adult, it was found that mature testes were present but ova were not. In the case of one adult specimen which had a number of young individuals attached to its ventral surface, it was found that the testes were mature, the organ appearing as a hollow chamber in which sperm groups were abundant. No ova were present in the ovary. Another adult specimen showed the testes as solid capsular masses in which there was a stroma-like matrix containing small blood-channels and groups of sperm-elements. In the ovarial chambers were present a great number of ova.

Female organs.—The ovaries are a pair of asymmetrical sacs extending backwards from the genital aperture in the median lacuna, ventral to the digestive tube. The vagina, which is the most anterior part of the female apparatus common to both sacs, appears to be filled with a mass of connective tissue previous to the laying of the eggs. It extends as far as the first pair of crop-cæca, lying in the ventral lacuna which, in this region, is narrow and bounded laterally by groups of strongly developed dorsi-ventral muscles which extend down the sides of the proboscis-sac. Opposite the point of origin of the first pair of crop-cæca the vagina passes into the anterior part of the ovaries. Here

the ventral lacuna becomes much wider owing to the disappearance of the dorsi-ventral muscles.

Fig. 4.—*Glossiphonia australiensis*, sp. n. Diagram of female organs.

The ovaries are large hollow sacs lying in certain regions in the large ventral lacuna, in other regions in the lateral portions of this lacuna according as the dorsi-ventral muscles are absent or present. Each ovary consists of three pouches, the first pair of which arises at its anterior extremity. These pouches are compressed antero-posteriorly, and appear oblong in transverse sections. They lie in lateral horns of the ventral sinus. The second pair of pouches lies in the median sinus itself, and resembles the anterior pair except that the pouches are smaller. The third pair of pouches constitutes the main portion of the ovaries. Whereas in the first and second pairs the wall is quite regular in outline, in the third pair the wall is much folded and irregular in outline. They arise at the point at which the proboscis passes into the œsophagus, and extend as far as the stomach. The ventral lacuna is here enormously developed, the dorsi-ventral measurement representing fully one-half the thickness of the section. The ovaries in this region, when the ova are stained with hæmatoxylin, form the most imposing structures in the body. The right ovary extends for some distance beyond that on the left side. They do not lie symmetrically, the right ovary

at intervals passing across partly into the left portion of the lacuna, and vice versâ.

That the pouches represent permanent structures, and not mere temporary dilatations due to the pressure of a large number

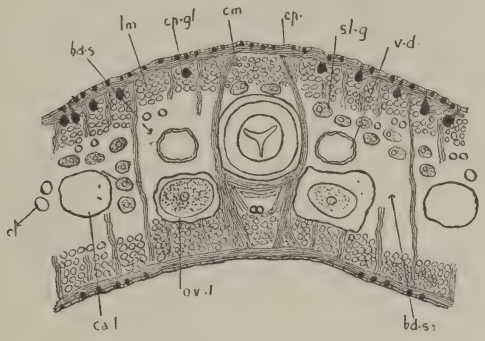


Fig.5.—*Glossiphonia australiensis*, sp.n.
Transverse section passing through the first pair of ovarial pouches. Compare (3) fig.7 and (1) fig.4. (References as in fig.6).

of eggs during the seasons of the year, is proved by the regular shape and symmetrical development of the first two pouches; and also by the way in which they lie in the ventral sinus, sometimes being cut off from the main portion of that cavity by the dorsi-ventral muscles.

Male organs.—The testes are arranged in six pairs.

In their early condition and during a season, as already mentioned, they are solid spherical organs containing abundant blood-supply. They lie immediately external to the ventral lacuna and imbedded in the body-tissue, and about half-way between the dorsal and ventral surfaces. Later they appear as crescentic hollow chambers containing abundant groups of sperms, the concave side of the testes facing towards the lacuna and crop.

The first pair lie immediately anterior to the point of origin of the first pair of crop-cæca. The others occur between the

successive cæca, the sixth pair lying in front of the last pair of crop-cæca.

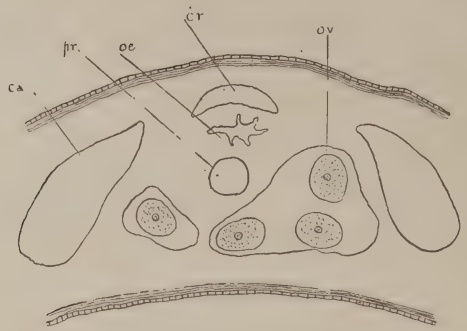


Fig. 6.—*Glossiphonia australiensis*, sp.n.

Transverse section passing through the crop, œsophagus, and retracted proboscis; and through the terminal portion of the ovary.

bd. s., body substance—*ca.*, crop cæcum—*ca. 1*, one of first pair of crop cæca—*cl.*, cœlomic sinus—*cr.*, crop—*cm.*, dermis + circular muscle—*ej.d.*, terminal horns of ejaculatory ducts—*ep.*, epidermis—*ep. gl.*, deep epidermal glands—*l.m.*, longitudinal muscle—*m.p.*, male genital aperture—*oe.*, œsophagus—*ov. 1*, first pair of ovarial pouches—*ov.*, terminal portion of ovary—*pr.*, proboscis—*pr. s.*, proboscis sac—*sl. g.*, salivary glands—*v.d.*, vas deferens.

In the species of *Glossiphonia* in general, the male genital ducts consist of a number of vasa efferentia which lead into a

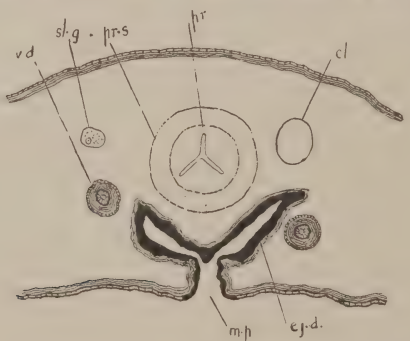


Fig. 7.—*Glossiphonia australiensis*, sp.n.
Transverse section passing through the male genital aperture.
(References as in fig. 6).

main collecting tube, or vas deferens, in each side of the body.

The vasa deferentia wind about in the ventral lacuna, and eventually pass into the seminal vesicles, which grade into the ejaculatory ducts each of which expands terminally into a thick-walled "horn" which, uniting with the terminal "horn" of the other side, opens to the outside by the male genital aperture. The junction of the terminal "horn" and ejaculatory duct, Whitman has shown to be the formation and extrusion of the spermatophore.

In *Glossiphonia australiensis* there are some points of difference from other species. The "horn" and the ejaculatory portions of the vasa deferentia are exceedingly thick and muscular. From the male genital aperture there is a narrow passage leading vertically to the junction of the two terminal horns. Each horn is spindle-shaped, and directed obliquely upwards, outwards, and forwards to lead into the ejaculatory duct. This duct turns towards the ventral side, and runs back in that position as far as the level of the male aperture, where it turns sharply towards the dorsal side. It now runs for some distance between groups of dorsi-ventral muscles in a space which represents a cornual and anterior prolongation of the median lacuna; on a level with the lumen of the proboscis.

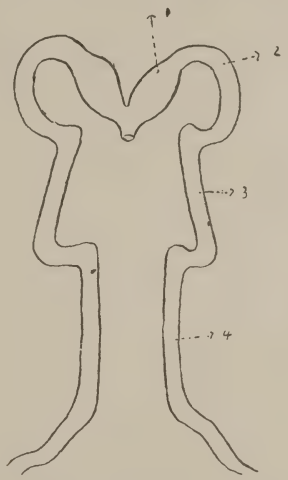


Fig. 8.—*Glossiphonia australiensis*, sp.n. Diagram of male reproductive ducts.

On reaching the region of the first ovarial pouches it turns sharply again to the dorsal side, and runs immediately dorsal and parallel to the pouch on each side of the body in the large lacuna which is here crescentic in shape, and surrounds the proboscis laterally and ventrally. In the region of the first pair of testes it turns sharply so as to run obliquely downwards and

outwards to the testes. From here no further traces of the male ducts can be found. Unlike other species of *Glossiphonia* there are no winding vasa deferentia in the median lacuna, and there appears to be a connection between the genital ducts and the digestive tube.

Nervous system.—As in all species of *Glossiphonia* there are twenty-one ganglia in the ventral nerve-chain. In connection with the constitution of the brain, I have been able to make out, from the study of the nerve-capsules, that the brain is composed of six fused ganglia. Oka has stated that he finds in the brain of *Glossiphonia* always thirty capsules, and he comes to the conclusion that it represents five fused ganglia. My conclusions are in accord with those of Whitman and Castle. As Castle has pointed out, Oka has possibly overlooked altogether the capsules of somite i., which lie anterior to the supra-œsophageal commissure. The posterior ganglionic mass represents seven fused ganglia.

Owing to the excellent work of Whitman, Castle, and Oka on the metameric constitution and ganglionic structure I cannot add anything of special interest in connection with the structure of the nervous system.

From the study of the nervous system it is seen that the body consists of thirty-four metameres, twenty-one of which are represented by the distinct ganglia of the ventral nerve-cord.

Nephridia.—These are very much reduced and inconspicuous structures. No traces of the nephridial funnels have been seen in section, and no well marked nephridiopores. The exact number of nephridia I have been unable to determine; and I can find no mention of the number in connection with the closely allied species, *Glossiphonia heteroclita.*

Castle mentions in his account of the Fresh-water Rhynchobdellids of North America the number of nephridia in all the species except in *G. heteroclita.* Unfortunately I am not in possession of specimens of this species, and so cannot at present make any comparative remarks.

Oka and Bourne have written a good deal in connection with the nephridia in general, and I find in this species differences

quite marked from others. I hope later to deal at further length with the nephridia when I have obtained other species for comparison.

As far as I can make out at present, the nephridia in this species are evidently disappearing; and in this feature, coupled with the fact that the so-called "excretophore" cells are very large and exceedingly abundant in the organism, lends some special interest to the question.

Blood-system.—The blood-system of *Glossiphonia* has been so thoroughly worked out by Oka, that very little can now be added to our knowledge of that system. In general arrangement the system in this species agrees very closely with that in other species of the same genus. One conspicuous feature is the very well developed channels in connection with the diverticula of the stomach. As already stated, the intimate relation of these vessels with the diverticula of the stomach seems to point to the conclusion that the stomach functions in connection with digestion and absorption.

Glossiphonia inflexa, sp.nov.

A single specimen of this species was obtained by Mr. H. L. Kesteven near Waverley, Sydney.

The body is broad and flat, and of a pale sage-green colour. It is semitranslucent. The marginal portion of the body is very thin, and in the preserved specimen folded under the ventral surface.

The length in an unextended condition is 14 mm., the breadth 4·5 mm.

The surface is very smooth, and the annulations are not very distinct, except near the margins of the body, and at the anterior extremity. The total number of annuli is seventy.

No eyes are present, and sense papillæ are present only in the middle body-region, where they occur on every third annulus.

The anus is situated on the dorsal surface of the last annulus, and has a much folded contour.

The genital apertures are united, the common pore being on the twenty-eighth annulus immediately behind a clitellar swelling

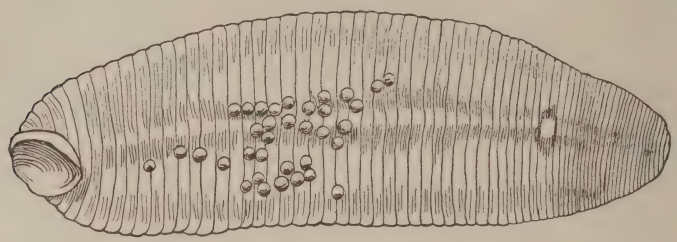


Fig. 9.—*Glossiphonia inflexa*, sp.n.
Ventral view showing the clitellum, and the reproductive aperture immediately behind it.

which extends from the anterior border of the twenty-seventh to the middle of the twenty-eighth annulus.

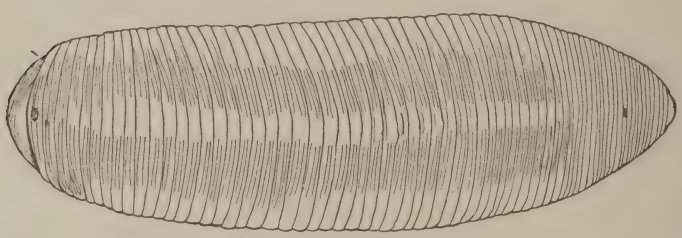


Fig. 10.—*Glossiphonia inflexa*, sp.n. Dorsal view.

Attached to the ventral surface were thirty-five eggs arranged singly.

Semilageneta, gen.nov.

Body thick, pear-shaped; dorsal surface convex, ventral surface flat. Somites denoted partly by papillæ, partly by sulci. Somites triannulate in the greater part of the body, and twenty in number, as seen on external examination.

Semilageneta hilli, sp.nov.

This leech was obtained in freshwater near Oberon, N.S.W., by Dr. J. P. Hill.

In the extended condition it is pear-shaped in outline, with a convex dorsal, and flat ventral surface. The greater portion of the ventral and dorsal surfaces are marked with grooves which divide the body into areas corresponding to the somites, as is found on more detailed examination.

The colour is a pale green.

The anterior portion of the body possesses numerous sets of sense papillæ.

The first somite is uniannulate, the second biannulate, and the remaining somites triannulate.

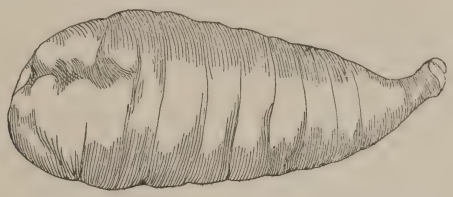


Fig. 11.—*Semilageneta Hilli*, gen.et sp.n.
Dorsal view. (Drawn from a photograph).

The head is constituted by eight annuli, the ninth annulus forming the posterior margin of the anterior sucker. Around the margin of the sucker, and on each of the annuli composing it are papillæ which are much larger than the other sensory papillæ, and probably represent goblet organs.

Fig. 12.—*Semilageneta Hilli*, gen. et sp. n.
Ventral view. (Drawn from a photograph).

The sense papillæ occur on the first annulus of each somite, as Whitman found to be the case in the leeches he examined. Castle, however, in his careful work on American Rhynchobdellids, came to the conclusion that the papillæ denoted not the

first but the middle annulus of a somite as far as the species of *Glossiphonia* are concerned. That this is not the case in the genus here described can be seen by glancing at fig.13.

The first somite is uniannulate, and has on its dorsal surface six papillæ. The second somite is biannulate, and has six papillæ on the first annulus. The two papillæ nearest the mid-line are much larger than the lateral pairs. The remaining somites are triannulate. In the third and fourth somites the sense papillæ are similar to those of the second somite. The papillæ are similarly arranged on somites v.-xi. inclusive, but are all of the same size and much smaller than on the preceding somites. Behind the eleventh somite the papillæ disappear; and the somites are distinctly marked off by definite sulci, producing a lobed margin, as can be seen in figs.11-12. Nine such somites can be made out behind the eleventh in dorsal view. The sulci do not reach the mid-line, and along that region is a well marked ridge. The nineteenth somite is wedged in between the eighteenth and twentieth in a peculiar fashion.

The total number of annuli is sixty-eight, sixty lying behind the posterior margin of the oral sucker. The annuli of somites eleven to eighteen inclusive are much larger than those of the remaining portion of the body, and increase gradually in size as they pass backwards from the eleventh somite. The annuli of the first eleven somites are very distinctly marked off from one another, the division in the case of the others being denoted by a fine line. The arrangement of the papillæ indicates that the somites in the greater part of the body are triannulate. This is corroborated by the arrangement of the ganglia in the ventral nerve-cord. In making an incision in the organism preparatory to imbedding in paraffin, I exposed portion of the nerve-cord and found that three ganglia thus seen each supplied three annuli.

If, as Castle found in species of *Glossiphonia*, the sense papillæ occurred not on the first annulus of a somite but on the middle one, it would be found that the first somite would be uniannulate, the second uniannulate, and the third triannulate; or the second biannulate, and the third biannulate, the remaining somites being

triannulate. This arrangement would leave the last annulus of the somite, which I have labelled xi. (fig. 13) unaccounted for,

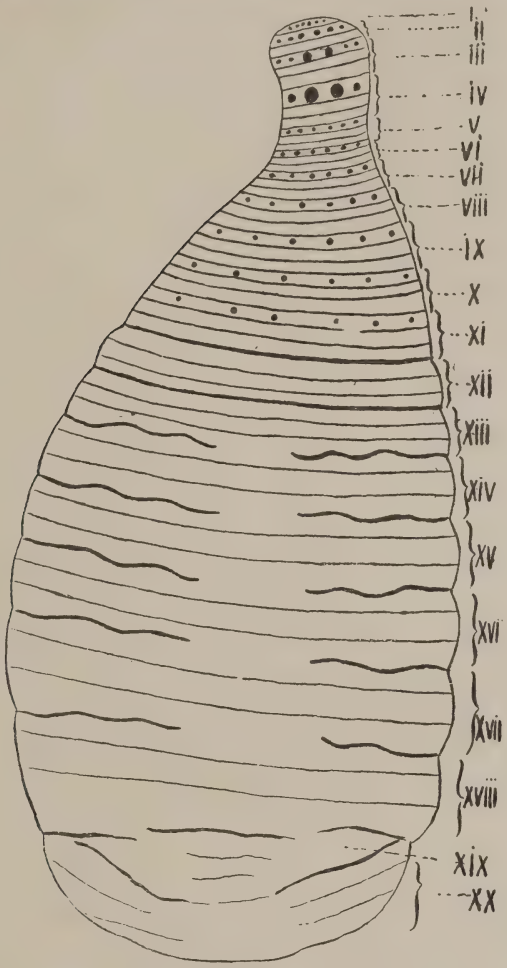


Fig. 13.—*Semilageneta Hilli*, gen. et sp.n.
Diagram showing the metameric arrangement in the annuli.

inasmuch as the sulcus behind this annulus certainly marks the line of division between somites xi. and xii. This important

point of difference between *Glossiphonia* and *Semilageneta*, as regards the metameric significance of the papillæ, is rather astounding inasmuch as they are members of one family.

Another point of interest in connection with *Semilageneta* is the great reduction of somites which are generally visible as part of the body. Here we find fourteen, instead of seven, somites represented in the acetabular region.

No eyes are present.

The genital apertures are apparently united, the common pore lying on the posterior portion of the twenty-first annulus, that is the last annulus of the eighth somite.

LITERATURE.

'88. Apathy, S. - Susswasser-Hirudineen. Ein Systematischer Essay. *Zool. Jahrb., Abth. f. Syst.* Bd. iii.

'04. Benham, W. B.—On a new Species of Leech. *Trans. New Zealand Inst.* xxxvi.

'06. ———On two new Species of Leech in New Zealand. *Op. cit.* xxxix.

'96. Blanchard—Leeches from Argentine and Paraguay. *Boll. Mus. Zool. ed Anat. Comp. di Torino* xi., No.263.

'97. ———Zoologische Ergebnisse—Einer Reise in Niederländisch Ost-Indien. Bd.iv.

'84. Bourne, A. G.—Contribution to the Anatomy of the Hirudinea. *Quart. Journ. Micros. Sci.* Vol. xxiv.

'49. Budge, J.—Clepsine bioculata, Sav. *Verh. d. Naturh. Vereins Preuss. Rheinlande.* Bd. vi.

'00. Castle, W. E.—The Metamerism of the Hirudinea. *Proc. Amer. Acad. Arts and Sci.* Vol.xxxv.

'00. ———Some North American Freshwater Rhynchobdellidæ, &c. *Bull. Mus. Comp. Zool. at Harvard Coll.* Vol. xxxvi., No.2.

'01. Dendy and Olliver—On a New Zealand Freshwater Leech. *Trans. New Zealand Inst.* xxxiii.

'71. Grube—Beschreibungen einiger Egel-Arten. *Archiv für Naturgeschichte.*

'98. Moore, J. P.—The Leeches of the U.S. National Mus. *Proc. U.S. Nat. Mus.* Vol. xxi.

'46. Moquin-Tandon, A.—Monographie de la Famille des Hirudinées. Paris.

'94. Oka, A.—Beiträge zur Anatomie der Clepsine. *Zeit. f. Wiss. Zool.* Bd. lviii.

'86. Whitman, C. O.—The Leeches of Japan. *Quart. Journ. Microscop. Sci.* Vol. xxiv.

WEDNESDAY, JUNE 24TH, 1908.

The Ordinary Monthly Meeting of the Society was held in the Linnean Hall, Ithaca Road, Elizabeth Bay, on Wednesday evening, June 24th, 1908.

Mr. A. H. S. Lucas, M.A., B.Sc., President, in the Chair.

Messrs. EUSTACE WILLIAM FERGUSON, Boulevard, Strathfield, and SYDNEY GEORGE, Sydney University, were elected Ordinary Members of the Society.

The President read a draft of a letter of congratulation from the Society to Dr. Alfred Russel Wallace, in commemoration of the jubilee of the Darwin-Wallace enunciation of the Theory of Natural Selection in July, 1858.

The Donations and Exchanges received since the previous Monthly Meeting, amounting to 7 Vols, 60 Parts or Nos., 2 Bulletins, 3 Reports, and 6 Pamphlets, received from 50 Societies, &c., and one Individual, were laid upon the table.

NOTES AND EXHIBITS.

Mr. Fred. Turner exhibited botanical specimens, comprising *Rottboellia formosa* R.Br., collected near Collarenebri in north-western New South Wales. The seeds of this North Australian and North Queensland grass had no doubt been introduced into New South Wales by travelling stock. Several species peculiar to the northern part of Australia had, at various times, been collected on the camping-reserves and stock-routes in the north-west, or adjacent to them, and forwarded to him for identification, but he did not regard these plants as indigenous to New South Wales.—*Panicum glabrum* Gaud. (syn. *Paspalum ambiguum* DC.), collected by him first in 1904 and again in 1908, at Vaucluse, near Sydney. In the interval this Indian grass had spread very rapidly on the Vaucluse estate, and was now quite acclimatised.—*Lysurus australiensis* C. & M., a remarkable fungus, forwarded from Woolwich, Parramatta River.

Mr. Fletcher showed germinating seeds of the Fire-Tree, or Christmas-Tree of West Australia (*Nuytsia floribunda* R.Br.), one of the only two Australian terrestrial representatives of the N.O. *Loranthaceæ*, at interesting stages of development; and he intimated that, when the specimens were more advanced, he hoped to be able to show them again, for comparison with a series illustrating the germination and early growth-stages of the Eastern terrestrial member of the Order, *Atkinsonia ligustrina* F.v.M., which presented some noteworthy differences in regard to both the number and the behaviour of the cotyledons.

A CATALOGUE OF THE HEMIPTERA OF FIJI.

By G. W. Kirkaldy.

(Plate iv.)

The present paper is based on the collections made in Viti Levu, in 1905, by Mr. Albert Koebele, and in 1906, by Mr. Frederick Muir, when searching for parasites and predators to control the ravages of the "Sugar-cane Leaf-hopper" (*Perkinsiella saccharicida*) in the Hawaiian Islands.

In addition to these official materials, I have included an account of some Hemiptera kindly sent to me by Mr. Charles H. Knowles, Superintendent of the Department of Agriculture in Fiji. These are specially valuable, as being accompanied, in most cases, by indications of the food-plants. The leaf-hoppers have already been worked out,* the descriptions in this paper principally concerning the Heteroptera.

The previous total of Fijian Hemiptera was about 40. This has now been brought up to 202 (of which seven have not been specifically determined), but it is evident that the endemic forms are scarcely yet collected. Only three islands have been searched for Hemiptera, viz., Viti Levu, the largest island and the seat of the present capital; Ovalau, a small island, the former seat of government; and Taviuni, an island to the east of Vanua Levu. The whole Archipelago must be exceedingly rich in Hemiptera, and we know probably less than a tenth of the total of that fauna.

Fiji was associated, by Wallace, with other Pacific islands, in a "Polynesian Subregion," but its Hemipterous fauna seems decidedly continental, and to be included in the "Austro-Malayan

* 1906, Bull. Ent. Hawaiian Sugar Planters' Experiment Station, i. pp. 269-479, Pls. xxi.-xxxii.; and 1907, *op. cit.* iii. pp. 1-186, Pls. i.-xx.

Subregion" of the Australasian Region. However, till the present total is at least trebled, detailed discussion would be of very little value.

All the localities mentioned, except Ovalau and Taviuni, are in Viti Levu.

New Genera, etc., described in this Paper.

Nesostethus (subg. of Stalagmosthetus).
Insulicola.
Holophygdon.
Nesocypselas.
Nesocysta.
Phantasmatophanes.
Nesocrypha.
Anthropophagiotes.
Nesosylphas.
Nesodaphne.
Nesiope.

New Species, etc.

Calisius pacificus.
Ctenoneurus bergrothianus, C. fungicola.
Leptocoris insularis.
Graptostethus vitiensis.
Stalagmostethus ornatus.
Ninus stylatus, N. subsessilis.
Ontiscus vitiensis.
Bedunia nesiotes.
Insulicola pacificus, I. oceanicus.
Elasmolomus insularis.
Sinierus vitiensis.
Germalus pacificus, G. oceanicus (with var. *interrupta*).
Phatnoma pacifica.
Holophygdon melanesica.
Nesocypselas dicysta.
Nesocysta rugata.
Enicocephalus fungicola, E. corticicola.
Oncocephalus pacificus.
Phantasmatophanes muiri.
Gardena pacifica.
Ploiariodes calamine, P. euryale, P. stheno, P. medusa.
Luteva circe.

Microvelia pacifica.
Anthocoris pacificus.
Mesocrypha corticicola.
Eucerocoris thetis.
Tichorhinus vitiensis.
Anthropophagiotes thanatopharus.
Hyaloscytus elegantulus Reuter var. *filicicola.*
Notostira pacifica.
Nesosylphas pacifica.
Cyrtopeltis (?) *nicotianæ.*
Nesodaphne knowlesi.
Nesiope ornata.

Fam. **CIMICIDÆ.**

1. Platynopus melacanthus.

Pentatoma melacanthum Boisduval, 1835, Voy. Astrolabe, Ent. ii. 628, Pl. ii. f. 7.

Rewa (March and November; Muir). Also recorded from the Moluccas, Papua, New Caledonia, Lifu and Murua (Woodlark).

2. Canthecona cyanacantha Stal, 1870, Svensk. Vet. Handl. ix. No. 1, p. 42.

Rewa (March-April; Muir); Suva and Nadi (Knowles, No. 187).

Two Oriental species of this genus are known to prey on caterpillars; thus the Fijian species may be of economic importance.

3. Catacanthus viridicatus Distant, Trans. Ent. Soc. London, 1881, 215.

Rewa (November; Muir); Suva (Knowles, No. 32). Also from the Tonga Isles.

Although the Fijian examples differ from Distant's description (which was drawn up from a Tongan one), I believe the former to belong to his species. Distant writes that the second segment of the antennæ is a little shorter than the third, and subequal to the fourth; the fifth broken off. In the Fijian specimens, the fourth segment is distinctly longer than the third, so that I suppose a part of Distant's fourth was broken off with the fifth.

The colouring of the Fijian examples, to the differences between which and the Tongan I attach little importance, is as follows :— Vertex, pronotum and scutellum dark metallic green, the pronotum with a bluish discal discoloration, scutellum with the posterior angle luteous. Antennæ dark bluish-black, a ferruginous spot on the first segment. The elevated lateral margins of the pronotum luteous. Clavus and corium (except the greenish embolium) reddish-bronzy, membrane bronzy. Tergites black partly with a bluish gleam, their pleurites luteous, bright metallic bluish-green at the incisures. The underside (including the first segment of the labium and the dorsal side of the second) luteous, abdominal spine tinged with red; a bright greenish-blue spot at the incisures of the sternopleurites, also two bluish-green spots on the pygophor; rest of labium blackish-brown. Coxæ and femora reddish-luteous; extreme apex of femora, tibiæ and fore tarsi blackish with a dark bluish-green gleam; other tarsi mostly yellow. Length 28-30 mill.

Rewa (November; Muir); Suva (Knowles, No.32).

4. Piezodorus rubrofasciatus (Fabricius) Stal, 1876, *l.c.* xiv., No.4, 100.

Rewa (April; Muir); also Ovalau. Also from "North Australia," New Caledonia, Tahiti, through the Malayan Archipelago to India, Cochin China, Philippines and Japan. Likewise throughout East Africa.

In the work of Stal cited above (p.100), there is a misleading error, which I think has been called attention to elsewhere by my friend Dr. Breddin. It is *P. pallescens* in which the second segment of the antennæ is shorter than the third; it is longer in *P. rubrofasciatus.*

The nymph in the last instar has the general colouring and appearance of the adult, but is broader in proportion. Apex of the second segment of the antennæ blackish. Tergites spotted with sanguineous. Labium extending well beyond the hind coxæ. Antennæ 7, 20, 15, 18. The anterior margin of the pronotum is only slightly roundedly emarginate, instead of somewhat deeply as in the adult; lateral margins narrowly laminate and

minutely, roughly crenulate on the anterior half. First odoriferous orifices not paired. Sternites basally with a short, blunt tubercle.

5. Hyparete vitiensis Distant, Trans. Ent. Soc. London, 1901, 585.
"Fiji."

6. Vitellus insularis Stal, 1876, *l.c.*
Rewa (Muir),

7. Pegala biguttula Haglund, 1868, Stettin. Ent. Zeit. xxix. 159.
Rewa (March; Muir).

8. Geotomus pygmaeus (Dallas) Signoret, 1883, Ann. Soc. Ent. France (6) iii. 51, Pl. 3, f. 160.

Rewa (March; Muir). Also from India to Japan and through the Malayan Archipelago to New Caledonia; also immigrant into the Hawaiian Isles. This species has been found in the soil attached to plants introduced into the Hawaiian Isles, this doubtless accounting in part for its extensive distribution.

9. Coleotichus nigrovarius Walker, Schouteden, 1905, Ann. Mus. Hung. iii. 358, Pl. 9, f. 8.
Suva (Knowles, No. 122); Ovalau (Walker).

10. C. sordidus Walker, Schouteden, 1904, Gen. Ins., fasc. 24, Pl. i., f. 1.
"Fiji." Also Australia, New Caledonia and the Isle of Pines.

11. Tectocoris diophthalma (Thunberg).
T. lineola Stal, 1873, *op. cit.* xi., No. 2, p. 11.

Rewa (March; Muir), a single example somewhat intermediate between Nos. 11 and 12 of Plate 28 cited below; Suva, Lautoka, Nadi, Ba, Rewa, Caboni and Sigatoka (Knowles, No. 31), therefore probably all over Viti Levu. The life-history has been partially worked out by Dodd, Trans. Ent. Soc. London, 1904, 483-5, Pl. 28. Mr. Knowles informs me that he found a half-grown nymph with its setæ inserted in the body of a larva of a Zygoenid moth, *Levuana iridescens* Bethune-Baker, common in Fiji as a Coconut pest.

12. Lamprophara bifasciata (A. White) Schouteden 1904, *op. cit.* 31, Pl.2, f.1.

Rewa (March; Muir); Ovalau. Also Samoa.

I have not seen White's description, but suppose his species to be represented by Schouteden's figure. The examples collected by Mr. Muir belong to var. *quadrifera* (Walker), which lacks the pronotal band down the middle.

Nymph of last instar reddish-ochraceous. Vertex, hindmargin (broadly) of pronotum, the rounded posterior angle of the scutellum, lateral margins and the centre of the abdomen above, tibiæ, etc., metallic green, often with a blue tinge. Antennæ black, base of first segment ochreous. Tarsi more or less fuscous. Tegminal pads metallic green, with blue and bronzy reflexions in part. Subrotundate, convex above, concave below; vertex, pronotum, scutellum and tergites punctured. Head horizontal, lateral margins only slightly sinuate (not almost subangularly concave as in the adult). Labium extending to the middle of the sternites. Antennæ 4, 7, 7, 8½. There are two large, broad flaps on the fifth and sixth tergites, and two tiny lateral openings on the fourth.

13. Brachyplatys pacifica Dallas, 1851, List, 70.

Viti Levu (November; Muir, No.23), on *Saccharum officinarum*, also arboreal. Found also in the Tonga Group (Vavau and Tongatabu), and "Sula," Jilolo, Wallis Is. and the Marianas (or Ladrones) Is.

14. Calisius pacificus, sp.nov.

Allied to *C. interveniens* Bergroth, but is a little smaller, differently coloured, and with different antennal proportions. Head brownish-testaceous, the rest of the body ferruginous, except the following parts, which are blackish or dark fuscous, viz., eyes, apical half of the fourth segment of the antennæ, labium, tarsi, a suboblique band on the anterior half of the scutellum exteriorly, and the posterior third of the same; also specks on the pleurites. Labium extending to the base of the

head. Fourth segment of the antennæ less than twice as long as the third. Length $2\frac{1}{2}$ mill.

Rewa (Muir).

15. Carventus sp.?

Viti Levu (January; Muir, No.68), on *Acacia* sp.; Rewa (March; Muir).

16. Mezira thoracoceras (Montrouzier).

Brachyrrhynchus thoracoceras Bergroth, 1886, Verh. zool.-bot. Ges. Wien, xxxvi. 59.

Rewa (March and December; Muir). Also from Papua, "North" and West Australia, New Caledonia, Murua, etc. On *Hibiscus tiliaceus* and under bark, according to Montrouzier.

The nymphs are not remarkable except that the third and fourth segments of the antennæ are not separated, and that all the segments are covered with apparent sensory organs.

17. Ctenoneurus bergrothianus, sp.nov.

Differs from the Maorian *C. hochstetteri* by its smaller size, much blunter eye-spine, the fourth segment of the antennæ very distinctly longer than any of the other three, and the scutellum scarcely extending posteriorly beyond the inner margin of the corium. Pitchy-black, eyes whitish-yellow; labium orange-brown. Coxæ, hind area of pronotum, the antennal and pedal articulations, reddish or reddish-pitchy. Apical margin of corium golden-yellow with a fuscous spot medially. Membrane sordid vitreous, with many thin, confused, dark veins. Length 6 mill.

Rewa (Muir), infested with a testaceous-coloured Acarid.

18. C. fungicola, sp.nov.

Ferruginous, darkening locally. Head, antennæ, pronotum, scutellum, clavus and corium pitchy; apical margin of corium golden-yellow. Eyes bright red. Membrane yellowish-hyaline, apical half of lateral margin and the apical margin continuously narrowly fuscous. Legs fusco-ferruginous. Tergites apparently yellowish-ferruginous, pleurites fusco-ferruginous with yellowish-ferruginous spots. Head extending apically to about half the

length of the first segment of the antennæ, shortly bifid, the apices of each fork rounded. Spine behind eyes not prominent Antennæ 17, 10, 15, 15. Labium not quite reaching prosternum. Pronotum with the anterior margin roundly emarginate, antero-lateral angles acute. Genital segment and the projections lateral of it all rather prominent. Length 3½ mill.

Viti Levu (March; Muir, No.150), under the bark of an old tree full of fungus.

The nymph in the last instar is very similar to the adult. Yellowish (dried), suffused dorsally with greyish. Eyes red. Lateral lobes extending very slightly beyond apex of head. Antennæ (of the single specimen before me) discordant; left 10, 7, 11, 14; right 10, 7, 17. The right antenna is trisegmentate; the left one appears to be quadrisegmentate, but there is no articulation or incision between the apparent third and fourth. As the latter is also the case in the nymphs (of the last instar at least) of *Mezira thoracoceras*, it is perhaps characteristic of Aradid nymphs.

Fam. **LYGAEIDÆ.**

19. Mictis profanus (Fabricius).

M. profana Stal, 1873, *op. cit.* xi. 44.

Rewa (March, April and November; Muir); Suva and island of Taviuni (Knowles, No.191). A widely spread species, inhabiting Ceram, Murua, Australia, Lifu, the Solomons and Samoa. The Fijian individuals, which scarcely differ from the more western, typical form, seem to be restricted to Fiji and Samoa, and constitute the var. *crux* Dallas.

20. Brachylybas variegatus (Le Guillou). (Plate iv., figs.4-6).

Gonocerus variegatus Le Guillou, 1841, Rev. Zool. 262.

Rewa (November, March and April; Muir); Ovalau. Also from Tonga.

This species is now figured dorsally and in profile, with a figure of one of the odoriferous orifices (Pl.iv., figs.4-6).

21. Theognis australis (Fabricius) Mayr, 1866, Novara Exp. Zool. ii. (2), p.101.

Rewa (March; Muir); Suva (Knowles, No.242).

22. Leptocorisa acuta (Thunberg) Stal, 1873, *op. cit.* xi., 86.

Rewa (February, March and November; Muir; and Knowles, No.140). Also from Australia and the entire Oriental Region.

The fourth segment of the antennæ is very distinctly longer than the first.

23. Noliphus insularis Stal, 1873, *op. cit.* xi., 87.

"Fiji."

24. Leptocoris insularis, sp.nov.

Head brownish-red, with a wide median blackish suffusion. Eyes and ocelli red. Labium, antennæ and legs (red coxæ excepted) black. Pronotum purplish-brown, the two impressed areas and the posterior half (more or less suffusedly) blackish. Tegmina purplish-brown, more or less darkened locally. Membrane metallic green, the basal margin narrowly peacock-blue. Sterna more or less reddish-brown; pleura greyish, lateral margins (and of the sternites) irregularly obscure red-brown, irregularly smudged with fuscous. Last sternite irregularly marked with red, black and orange-yellow. Antennæ with first segment extending well beyond apex of head, fourth segment distinctly longer than the second, which is a little longer than the third. Labium extending well behind the hind coxæ. Pronotum much as in *L. augur*.

♂. Last sternite roundly emarginate medially, postero-lateral angles rounded.

Length 18 mill.

Rewa (March; Muir).

25. Riptortus annulicornis (Boisduval), Stal, *l.c.*

Rewa (March; Muir). Also from Papua, Vanikoro and the Philippines.

26. R. sp.?

Rewa (March; Muir); Lautoka (Knowles, No.352), on leaves of "Mauritius-bean" (*Mucuna atropurpurea*).

This is almost certainly an introduced species, which I have not as yet been able to identify with certainty.

27. Dysdercus impictiventris Stal, 1870 *op. cit.* ix., 120.

Rewa (April and November; Muir); Suva (Knowles, No.185).

♂. Like the female described by Stal, but the head above and at the sides is black with a faint red speck where the ocelli should be. Callose part of pronotum and the lateral margins orange-yellow, hind lobe cinereous-yellow. Scutellum immaculate orange-red. Labium extending to the apical margin of the second sternite.

A var. with immaculate orange-brown head was in cop. with a female like the above described male.

Length, ♂ 11; ♀ 13-15 mill.

28. D. insularis Stal, *l.c.*

Rewa (April; Muir); Lautoka, "exceedingly common on land recently under cotton" (Knowles).

A var. occurs with the scutellum immaculate black. The labium extends to the middle of the fourth sternite (in Stal's sense).

Fam. **MYODOCHIDÆ.**

29. Graptostethus servus (Fabricius) Stal, 1873 *op. cit.* xii., 117.

"Fiji." Also distributed over the Oriental and Ethiopian Regions and Mediterranean Subregion of the Palearctic.

30. G. vitiensis, sp.nov.

Allied to *G. servus* (Fabr.), but distinguished by the long labium, which extends well beyond the hind coxæ, and by the black head and bucculæ. Black, with sparse, very short, pale yellowish-grey pubescence; vertex without a red spot at base,* bucculæ black. Pronotum red with a large black trilithon-like mark. Beneath black, the prosterna and propleura yellowish (or reddish laterally) with a black transverse stripe which broadens at each end suddenly; ambulacra, posterior and lateral margins of the pleura, and the pleurites, yellowish, or reddish. The

* In one example, there is a very faint pale red speck at the basal margin, but there is not the slightest trace in the others, even when treated with alcohol, as directed by Stal.

pleura all have a large velvety black spot laterally. Tegmina red, partly suffused with black (as in *G. servus*); membrane black, apically margined with whitish. Head not notably declivous; second and fourth segments of antennæ subequal, each a little longer than third. Labium extending well beyond hind coxæ. Length 7½ mill.

Rewa (March-April; Muir); Lautoka (Knowles, No.335).

31. Stalagmostethus mactans Stal, 1866, Berlin. Ent. Zeit. x.162.
"Fiji." Also Australia.

32. S. ornatus, sp.nov.

Head, pronotum and sterna (including ocelli and orifices) orange-red (paler beneath). Head between the ocelli at the base, eyes, apex of tylus, antennæ, labium, extreme angle of the latero-posterior part of pronotum, etc., black. Abdomen pale greenish. Tegmina very dark greenish with strongly elevated blackish-brown veins, membrane black. Fourth segment of antennæ longer than the second, which is longer than the first and widens gradually to the apex; the first extending just beyond apex of the head. Pronotum elongate, narrower apically than the head and eyes. Labium reaching to the middle of the hind coxæ. Femora unarmed. Length 9 mill.

Rewa (March; Muir).

This may form a new subgenus characterised by the colour, and by the following structural points: fourth segment of the labium longer than the third. A transverse keel near the anterior margin of the scutellum, a longitudinal one emitted from its middle. Pronotum with a keel, obsolete anteriorly. Tegminal veins very strong. It may be called *Nesostethus*.

33. Pyrrhobaphus leucurus (Fabricius) Stal, 1868, Svensk. Vet. Handl. vii. No.2, p.73.
"Fiji." Also from Murua, Ceylon and the Philippines.

34. Nysius sp.?
Rewa (March-April; Muir).

35. Ninus stylatus, sp.nov.

It is difficult to separate this from Stal's meagre description of *N. insignis*, but the general colour is much darker ferruginous, and there is generally a basal (sometimes an apical also) dark fuscous transverse vitta on the pronotum. The fourth segment of the antennæ is fuscous. The eyes are very distinctly stylate and turn a little upwards. The antennæ are much more slender (as regards the last three segments), the second being slightly clavate apically. Length 4-4¼ mill.

Rewa (March-April; Muir, No.30); Ba (January; Muir); Navua (February; Muir); common on *Saccharum officinarum*.*

36. N.(?) subsessilis, sp.nov.

The colour and pattern are almost exactly like those of *N. stylatus*, except that there is no extero-lateral spot on the corium, and the apical margin of the corium is yellowish. The eyes, although exserted, are not stylated.

♂. Sternites brownish-yellow, with a dark fuscous lateral stripe.

♀. Sternites brownish-yellow.

Length 4 mill.

Rewa (February; Muir); Navua (February; Muir); Muir's Nos. 115 and 124, on native fern; Suva (March; Koebele).

37. Ontiscus vitiensis, sp.nov. (Plate iv., fig.7).

Closely allied to *O. australis*, but the first two segments of the antennæ are concolorous with the head (*i.e.*, dark ferruginous), the others more dilute; there is a dark fuscous speck at the apex of the clavus and another on the apical margin of the corium. Membrane not fuscously veined. Legs yellowish. Head scarcely narrowed behind. Third segment of labium distinctly shorter than the first or second. Antennæ 12, 15, 11, 17, the fourth scarcely incrassate. Length, ♂♀ 5 mill.

Rewa (April and December; Muir); Ba (January; Muir).

---

* Dr. Bergroth informs me (*in litt.*) that he thinks, from my description, to him, that this belongs to the genus Breddin, the description of which, however, I have not seen.

38. Paromius seychellesus (Walker).

Plociomerus seychellesus Walker, 1872, Cat. Het. v.120.

Rewa (January-April; Muir); Ba (January; Muir). Also from Japan, Ceylon, Queensland and Samoa. It is perhaps only a form of *P. proximus* (Dallas), which I do not know in nature.

39. Bedunia nesiotes, sp.nov.

Head, third segment of antennæ and base of fourth, fuscous. Pronotum, apex of labium, pleura and sterna, black or blackish. Ocelli rubid. Collar pale ferruginous. Lateral margins of hind area of pronotum and the hind margin (irregularly), testaceous. Tegmina testaceous, clavus and intero-lateral margins of corium thickly and suffusedly punctured with fuscous; a large black spot right across the middle of the corium, also the hind angle of the corium black; membrane smoky, a central area obscurely ferruginous, apical margin paler. Sternites pale reddish-fuscous. First two segments of antennæ and the fore femora pale reddish-brown; middle and hind legs, labium, etc., yellowish-testaceous. Antennæ 22, 29, 24, 23. Length, ♂ $5\frac{3}{4}$ mill.

Navua (February; Muir).

Apparently allied structurally to *B. insularis.*

40. Orthoea limbata (Stal).

Pamera limbata Stal, *op. cit.* 149.

Rewa (February, March and November; Muir); Ba (January; Muir); Suva and Island of Taviuni (Knowles, No.188); Ovalau.

41. O. vincta (Say). (Plate iv., figs.1-3).

Pamera vincta Stal, *l.c.*

Orthoea periplanios Kirkaldy, 1907, Canad. Ent. xxxix. 426.

O. pacifica Kirkaldy, 1907, P. Haw. Exp. Stat. i. 151 (not Stal).

Rewa (April; Muir); Ovalau. Also from Australia and Tahiti; and throughout America, and the Oriental and Ethiopian Regions.

In the Hawaiian Isles, it is found on *Cynodon dactylon*, but I think it is insectivorous. The last nymphal instar is described

in the P. Hawaiian Exp. Stat. i. 151, and is now figured, together with a brachypterous adult, and a tegmen of a macropterous individual.

42. O. PACIFICA (Stal).

Pamera pacifica Stal, *op. cit.* 149.

"Fiji."

43. O. NIGRICEPS (Stal).

Pamera nigriceps Stal, *op. cit.* 152.

Rewa (February, March and November; Muir); Suva, Lautoka and Nadi (Knowles, No.189). Also from the Philippines, Tahiti and the Hawaiian Isles (introduced into the latter at least).

44. O. NIETNERI (Dohrn).

Pamera nietneri Stal, *op. cit.* 151.

Rewa (April; Muir). Also from the Philippines, Burma, Ceylon and Java.

The three females captured by Mr. Muir agree with Distant's description (1903, Faun. Ind. ii. 53), except that the fourth segment of the antennæ is bicolorous, the basal half pale, the apical half dark. This character is, however, mentioned by Stal.

INSULICOLA, gen.nov.

Elongate. Head longer than anterior lobe of pronotum, the central lobe extending well beyond the lateral lobe; exserted, but the hind area short. Ocelli fairly close to eyes. Labium reaching to, or beyond, middle of abdomen, first segment to base of head. Antennal tubercles reaching to base of tylus, first segment extending beyond apex of head, second nearly twice the first, and about one-half longer than the third, which is a little shorter than the fourth. Pronotum with an annuliform collar, lengthening a little in the middle, but nowhere a real collar (as in *Orthoea*, etc.); anterior lobe finely and sparsely punctured, much longer than the posterior, lateral margins rounded, gradually diverging, posterior margin (of anterior lobe) more closely and coarsely punctured, at least one-half wider than the anterior margin, very distinctly wider than head, which is distinctly

wider than anterior margin. Hind lobe with the lateral margins fairly straight, but widely divergent, posterior margin more than twice as wide as anterior margin of pronotum; anterior half medially carinate. Scutellum longer than wide, depressed basally and at the sides, coarsely punctured on anterior margin of disk and on the sides. Clavus with three or four irregular rows of punctures. Corium with two rows internally and the external margin of the apical half, closely punctured, the rest smooth and polished. Membrane with strong, curved veins. Fore femora incrassate, with three or four longer spines and several shorter ones; tibiæ curved. First segment of hind tarsi nearly as long as the others together.

This has puzzled me considerably. Although there is not a proper collar, I would place it in the *Myodochini*. There is some affinity to *Dieuches* Stal, but the anterior lobe of the pronotum is entirely rounded. It is perhaps nearest to *Eucosmetus* Bergroth, but the head is much narrower and more elongate, and the pronotum is distinctly divergent laterally.

45. I. PACIFICUS, sp.nov.

Black; labium, antennæ, apex of tylus, etc., yellowish-testaceous, more or less sordid; "collar," posterior lobe of pronotum (both strongly punctured with blackish-brown), an elongate V on disk of scutellum, corium, etc., brownish-yellow. Clavus almost entirely dark fuscous. Corium with a large blackish spot at inner apical angle, the rest of the smooth part brown, punctures blackish-brown. Membrane dark fuliginous, veins pale and sordid, apex yellowish. Legs brownish-yellow, fore femora stained and spotted with dark brown, apex of fore tibiæ, etc., dark fuscous. Anterior lobe of pronotum twice as long as posterior lobe, medially. Fore femora strongly incrassate. Length, ♂ 10 mill.

Rewa (March; Muir).

46. I. OCEANICUS, sp.nov.

Very similar to the last, but smaller; and the anterior lobe of the pronotum barely one-half longer than the posterior lobe.

Fore femora much less strongly incrassate. Length, ♂ 7; ♀ 9 mill.
Rewa (March; Muir).

47. Elasmolomus insularis, sp.nov.

Apparently closely allied to the Philippine *E. v-album* (Stal), but the fusco-ferruginous of the head, scutellum, abdomen and legs is replaced by black. The anterior half of the pronotum is as in *E. v-album*, the posterior half is yellowish-testaceous, thickly and irregularly punctured with brownish-ferruginous. The explanate lateral margins are yellowish-testaceous, a fuscous spot near the apical margin and another at the base. The fore femora are black, except the extreme apex; apical half of middle and hind femora black, except the pale apex. Length 6 mill.
Rewa (December; Muir).

48. Sinierus vitiensis, sp.nov.

Head and anterior area of pronotum blackish or dark piceous. Antennæ brownish-yellow, second segment fuscate. Anterior margin (narrowly) of pronotum and the hind area brownish-yellow, thickly punctured with fuscous, and partly fuscously suffused. Scutellum dark fuscous, obscurely ferruginous medially. Tegmina dark fuscous, with some testaceous markings. Membrane irregularly dark smoky. Head beneath and sterna mostly piceous, sternites shining brownish. Labium and legs yellowish-testaceous, more or less fuscate. Head and pronotum gradually declivous. Pronotum, scutellum, sterna and tegmina thickly punctured. Labium reaching to middle coxæ. Antennæ 19, 25, 20, 24. Ocelli large, close to eyes. Length 3 mill.
Rewa (March; Muir).

There are also three species of *Pamerinæ*, belonging to as many genera. Distant has, however, recently proposed, in their neighbourhood, several Australasian genera, which are not identifiable with certainty, without illustrations or the inspection of types. I have therefore left these unidentified for the present.

49. Phaenacantha pacifica Horváth, 1904, Ann. Mus. Hung. ii. 136.
Rewa (April; Muir).

The fuscous vittæ on the hind area of the pronotum are not distinctly marked and not percurrent in the single example before me.

50. GERMALUS PACIFICUS, sp.nov.

Head pale orange (or pale chrome-yellow); the tylus and around the ocelli suffusedly black, or blue-grey (the extent variable). Eyes red. Antennæ yellowish-testaceous, more or less sordid. Pronotum pale yellow or yellowish-testaceous; a slightly oblique bluish-grey (or blackish-grey) transverse band on each side near the anterior margin, meeting medially (the pronotum anterior to this being chrome-yellow), at that place giving off a median line of the same colour almost to the base. There are also three black spots on the posterior margin, one near the lateral angles on each side and one in the middle. The pronotum is also varyingly punctured with dark brown. The Y-shaped keel on the scutellum is chrome-yellow and is punctured with black laterally, the rest of the scutellum bluish-grey or blackish-grey. Clavus chrome-yellow, with three broad, blackish-grey longitudinal lines. Tegmina hyaline, tinged with cinereous, punctured with dark brown close by the radial vein; apical half of median vein and apical margin of corium suffusedly dark fuscous. Membrane hyaline, a fuscous smudge from basal angle to apical margin (sometimes faint). Pleura black, lateral and hind margins more or less yellow. Ambulacra, legs and labium yellowish-testaceous; femora speckled with brown. Odoriferous orifices yellow. Tergites pale chrome-yellow, a sublateral black stripe on each side, meeting apically. Sternites orange or chrome-yellow, with a sublateral greyish-black or bluish-grey stripe, disk yellower and more sordid, basally black. Labium extending to middle coxæ. Length 5 mill.

♂. Sternites very hairy, the pilosity pale.

♀. Ovipositor-sheath black.

Rewa (February-April, November, December; Muir).

51. G. OCEANICUS, sp.nov.

Allied to the last, but the bluish part of the vertex is much less in extent and the transverse lævigate areas on pronotum

anteriorly are concolorous, yellow, though bordered posteriorly with fuscous. Scutellum yellow, basally a little dark, punctured with fuscous. Clavus with two longitudinal dark lines, and tergites without black stripes. Beneath pale yellow; pleura strongly punctured with dark brown; sterna black; sternites basally rosy. Labium extending to hind coxæ.

♂. The hairiness on the sternites is white, not yellowish-testaceous, as in *G. pacificus*.

Length 5 mill.

Rewa (November; Muir); Ba (January; Muir).

Var. (b) INTERRUPTA, nov.

The median line down the pronotum scarcely extends beyond the middle, but the lævigate area is suffused partly with greyish-black.

Rewa (April; Muir); Navua (February; Muir).

In the nymphs of the last instar, the head is very short and declivous; eyes scarcely pedicellate, slightly decumbent on the pronotum. Lateral margins of pronotum and tegminal pads laminate. There are two odoriferous orifices, on the 5th and 6th tergites. Yellowish-testaceous; disk of pronotum (except anteriorly), of nota (a thin yellow line down the middle) and of tegminal pads dark fuscous, extending obliquely on to apical half of the pads; a broad median band down the tergites reddish-piceous; glandular areas and most of the last segment, dark fuscous. A dark spot at the apico-lateral angle of each abdominal segment. Apical three-fourths of antennæ fuscous. Pleura marked with black.

52. G. SP.?

I have received from Mr. Knowles (No.229), from Lautoka, a nymph of a species of *Germalus*, which is evidently new. The adult would probably be identifiable from the nymphal description, but I prefer to wait for the arrival of the adult before naming it.

Fam. TINGIDÆ.

53. PHATNOMA PACIFICA, sp.nov.

Pale cinereous; tegmina and pronotum more or less lightly clouded in part with fuscous, but there is no definite pattern, and the extent and degree of infuscation are not the same in any two individuals. Sterna and abdomen also more or less fuscous. First two and basal half of first segment of antennæ brownish-testaceous, rest dark fuscous. The form is much like that of *P. marmorata* Champion, but the keels of the pronotum are very prominent, the median extending onto and far beyond the anterior lobe, and the second antero-lateral spine is more acute and directed more forwards. There is one long, median, porrect spine on the head anteriorly, followed by a long, submedian one on each side, these being basally contiguous, subporrect and apically divergent; then a long one on each side at the base, basally remote, semierect, apically divergent; laterally there is one long spine on each side between the eye and the antennal insertion, and one on each side anterior to the antennæ; nine in all on the head. The underside of the head is carinately foliaceous and reticulate, the bucculæ acutely prominently anteriorly. The cross-keels on the discoidal and subcostal areas are not very strong, though a little variable in this respect. In the costal area there are 4-7 cells of subequal size in each row, though these are irregular, and on the exterior margin, which is minutely multisinuate, there are much larger individual cells at intervals. The sternites are channelled to the base of the genital segment, the labium lying along this channel, right to the end. The last two or three sternites, except the last, are apically emarginate angularly. Tegmina and wings extend well beyond the apex of the abdomen.

♂. Last segment shaped much as in that of *P marmorata*, but much more emarginate broadly, the genital segment being much larger.

♀. Last sternite deeply emarginate, the lateral margins a little produced posteriorly, and the middle triangularly produced, so that the sternite is really bisinuate.

Length $3\frac{7}{8}$-$4\frac{1}{8}$ mill.

Viti Levu (March; Muir's No.102), on a native tree; Rewa (March; Muir).

This is nearest, perhaps, to *P. marmorata* Champion, from which it differs by the different form of the pronotum, the minutely multisinuate lateral margins of the tegmina and the different cell-form of the costal area, also by the genital segments. It differs from any species of *Phatnoma* by the middle keel of the pronotum extending beyond the apical margin, and by the very long labium.

HOLOPHYGDON, gen.nov.

Very distinct from any other genus by the form of the pronotum. Allied remotely to *Gargaphia* Stal. Head small, almost angularly convex above, spineless. First segment of antennæ longer than head. Bucculæ high, extending slightly beyond head, the space between them oval. Labium not reaching to base of mesosternum, and there are no sternal sulci, or at least only broad, somewhat impressed areas between the ambulacra. Pronotum entirely composed of a large subglobular cyst, largely reticulate, medianly keeled, not covering the head; the sides are thus not at all carinate, explanate or foliaceous, and the basal margin is perpendicular, not acutely produced. Discoidal area scarcely visible, tumid. Subcostal area largely reticulated irregularly, and there is no costal area differentiated. Tegmina extending far beyond abdomen.

54. H. MELANESICA, sp.nov. (Plate iv., figs.10-11).

Pale yellowish, legs, etc., paler. Apical four-fifths of last segment of antennæ, tarsi, apex of labium, etc., black. Tegmina hyaline (except discoidal area), veins pale yellow, sometimes apically fuscous. Length $3\frac{1}{4}$-$3\frac{1}{2}$ mill.

Viti Levu (November; Muir's No.34), on a native tree-climbing plant; Rewa (April and December; Muir).

NESOCYPSELAS, gen.nov.

Allied to *Derephysia* Spinola, but very different from anything known to me. Head minute, spineless; antennæ slender, second

segment three or four times as long as first, third a trifle more than fourth, and about seven times as long as second. Labium short. Pronotum transverse, minute, tricarinate, scutellum visible from above; laterally, however, the pronotum is foliaceously dilated, extending posteriorly a little further than scutellum, laterally curving around inwards so as to form (as seen from above) a hollow curved tube on each side, the sides of which do not quite meet internally; these two tubes meet anteriorly, extending beyond the head; posteriorly they are remote, fully displaying scutellum. They are largely reticulate, but not carinate, the veins of the reticulation being minutely multispinose. Tegmina foliaceous, longitudinally depressed on subcostal area. Costal margin rectangularly dilated basally, apical margin obliquely, somewhat roundedly, truncate, extending far beyond apex of abdomen. Subcostal area biareolate, many of the veins minutely multispinose.

55. N. DICYSTA, sp.nov. (Plate iv., figs.8-9).

Head, pronotum and scutellum greyish; antennæ and legs pale yellow. Tegmina and foliaceous part of pronotum hyaline, veins partly concolorous, partly fuscous, spinules blackish. Tegmina with a small dark clouding close to base, and an outwardly curved stripe on apical half of tegmen exteriorly. Tarsi black. Length 3 mill.

Viti Levu (November; Muir's No.7); Ba (January; Muir); Rewa (March and November; Muir); Lautoka (Knowles, No.345); on leaves of *Artocarpus incisa*, the Breadfruit-tree.

NESOCYSTA, gen.nov.

Allied to the last, but the lateral lobes of the pronotum are remote anteriorly and, while hollow, are not swollen out, but appear as if somewhat crumpled; also, while in *Nesocypselas* the longitudinal opening of each is in the nota, in *Nesocysta* they open around the underside of the head. Labium extending just beyond middle coxæ. Second segment of antennæ about twice and one-half as long as first, third twice as long as fourth, which is nearly five times as long as second. Tegmina narrower than

in the preceding, and narrowly rounded apically; veins of pronotum and tegmina not multispinose.

56. N. RUGATA, sp.nov.

Colouring as in *Nesocypselas dicysta*, but the fourth segment of the antennæ is somewhat fuscous. Tegmina hyaline, veins concolorous; apically, many are dark fuscous, especially the middle longitudinal line, which is a little suffused. Length $2\frac{1}{8}$ mill.

Rewa (March; Muir).

57. MONANTHIA NATALENSIS (Stal).

Physatocheila natalensis Stal, 1855, Öfver. Vet. Akad. Förhandl. xii. 38.

Rewa (March; Muir). This species appears to have little to do with typical *Monanthia*. The specimens before me differ from African specimens apparently only by the femora being basally and apically, and the tibiæ basally, dark reddish-fuscous.

Fam. NABIDÆ.

58. GORPIS CRIBRATICOLLIS Stal, 1859, Öfver. Vet. Akad. Förhandl. xvi. 377.

Rewa (March; Muir). Also from Australia and Ceylon.

59. REDUVIOLUS SP.?

Rewa (Muir).

Fam. GERRIDÆ.

60. MICROVELIA PACIFICA, sp.nov.

Winged ♂: black; vertex laterally with a strip of silvery pubescence. Antennæ brownish-pitchy. Head beneath discally, anterior margin of pronotum (except laterally) and the latero-posterior margins of the same, ferruginous. Labium yellowish-brown, apical segment black. Tegmina whitish, apical third more or less fumate; veins broadly greyish-fuscous. Fore legs testaceous; tibiæ, tarsi and apex of femora fuscate. Middle and hind legs dark fuscous, base of femora testaceous. The general form is that of *M. flavipes* or *M. paludicola*, but the antero-lateral margins of the pronotum are straighter. Labium extending beyond base of prosternum. Antennæ about 9, 6, 8, 16. Hind tibiæ with short hairs.

Apterous ♀ narrowly ovate, pleurites converging and almost meeting apically.

Length $2\frac{1}{8}$ mill.

Rewa (April; Muir).

61. LIMNOGONUS DISCOLOR Stal.

Gerris discolor Stal, 1859, Eugenies Resa, Ins. 265.

Rewa (March; Muir); also a nymph from the same locality (February; Muir).

62. LIMNOMETRA CILIATA Mayr, 1865, Verh. zool. bot. Ges. Wien, xv.

"Viti Levu" (No. 4656, Godeffroy Mus.).

L. ciliata was originally described from Java.

Fam. **ENICOCEPHALIDÆ.**

63. ENICOCEPHALUS FUNGICOLA, sp.nov.

Head, pronotum, scutellum and legs brownish-ochraceous, the latter unicolorous. Eyes black, ocelli red. Sides of hind lobe of head faintly, pronotum laterally strongly, fuscous. First and fourth segments of antennæ ochraceous, the others fuscous. Tegmina dark fuscous, laterally paler. Abdomen testaceous, more or less fuscous. Posterior lobe of head moderately transverse, subglobose, pilosity rather thick (as also all over, including eyes). Ocelli prominent though small. Antennæ with the basal segments rather shorter than the apical, first segment scarcely reaching apex of head; second a trifle longer than fourth, which is a trifle longer than third. Pronotum with the posterior lobe much wider than the anterior, which is much wider than the collar; scarcely emarginate behind. Discal cell of tegmina closed, venation on general plan of *E. telescopicus* (*cf.* Kirkaldy, 1901, Ent. Mo. Mag. (2) xii. 219, fig. 2). Fore tarsi with long, uneven and somewhat connate claws. Length 5 mill.

Viti Levu (March; Muir's No. 146), under the bark of an old tree, filled with fungus.

64. E. CORTICICOLA, sp.nov. (Text fig. 1).

Very similar to the last, but larger. Head not laterally fuscous; base of fourth segment of antennæ fuscous. Pronotum,

sterna and pleura dark fuscous, anterior margin and middle of collar, and hind margin and middle of posterior lobe, ochreous. Second segment of antennæ rather longer in proportion. Eyes smaller and less prominent. Anterior lobe of pronotum longer and wider in proportion. Length 6½ mill.

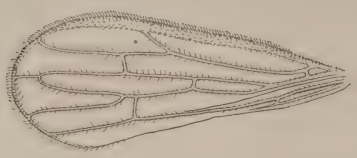


Fig. 1.—*Enicocephalus corticicola;* tegmen.

Viti Levu (Muir's No. 155), under the bark of an old fungus-filled tree.

It is possible that this and the preceding are the two sexes of one species, but no one has succeeded as yet in differentiating these forms sexually.

The nymph of the last instar (of one species or the other) is very similar to the adult, but the antennal segments are all stout, the fourth segment much the longest. Anterior and posterior lobes of the pronotum equally wide, much wider than the collar. Fore claws a little less connate.

Fam. REDUVIIDÆ.

65. Polytoxus sp.?

Rewa (February and November; Muir).

66. Oncocephalus pacificus, sp.nov.

Very closely allied to the Mascarene *O. angulatus* Reuter, but the eye (♂) occupies the whole height of the head, and the prosternal spines are more strongly uncinate. First segment of antennæ pale brownish-yellowish, a little infuscate beneath apically, second segment yellowish. Sterna and pleura yellowish-brown, irregularly striped and marked with fuscous. Sternites yellowish-brown, with a broad sublateral and a narrow submedian indeterminate dark fuscous stripe down each half. Pleurites brownish-yellow, a fuscous spot on apical margins of each, exteriorly. Fore femora less incrassate, with ten spines. Hind femora strongly adspersed with blackish-fuscous, darker and closer apically, base and trochanters pale. Prosternal spines

prominent, subporrect, apically downwardly uncinate. Postero-lateral angles of pronotum also stronger. Length 14½ mill.

Rewa (March; Muir).

67. Pygolampis foeda Stal, 1874, Svensk. Vet. Handl. xii. No.1, p.85.

"Fiji." Also from "North Australia," the Philippines and Ceylon. Probably not endemic.

68. Polididus armatissimus Stal, Distant, 1904, Faun. Ind. Rh. ii. 386, f.246.

Rewa (December; Muir). Also from the Philippines, Japan and the Continental Orient.

69. Tunes saucius Stal, 1866, Berlin. Ent. Zeit. x. 165.

"Fiji."

70. Alloeocranum biannulipes (Montrouzier and Signoret), Kirkaldy, 1902, Faun. Haw. iii. Pl. iv. f.17.

"Fiji." A very widely distributed form.

Phantasmatophanes, gen.nov.

Allied to *Stenolemus* Signoret, but distinguished from all the other Ploiariinæ by the very long, thin pronotum, and the tufted antennæ and legs. Head pilose, but not spined; hind lobe of vertex narrowed behind eyes, laterally trituberculate on anterior margin; first segment of labium extending about as far as, or a trifle farther than, from its base to an eye; second segment short and swollen, third attenuated, extending to about fore coxæ. First segment of antennæ about as long as pronotum, a little shorter than the other segments together, elongately pilose all around and with four thick tufts about equidistantly; other segments filiform, pilose, but not tufted. Pronotum about as long as the abdomen and other nota together, about as wide anteriorly as the eyes, suddenly narrowed, and, for about three-fifths of its length, columnar and very narrow, then widening out subtriangularly close to the base which is elevated and angularly emarginate; the basal part is laterally carinate, the carinæ beginning and ending each with a tubercle, also there is

a submedian tubercle on each side subanteriorly on this basal part. Scutum of metanotum with a small suberect spine. Tegmina extending beyond abdomen, ampliated interiorly near apex and suddenly concavely narrowed. Legs (except that the

Fig. 2.—*Phantasmatophanes muiri.*

middle and hind coxæ are not tufted) pilose and tufted. Fore femora a little longer than tibiæ, strongly spined all along, tarsi apparently bisegmentate; hind femora extending far beyond abdomen, tarsi shorter than fore tarsi.

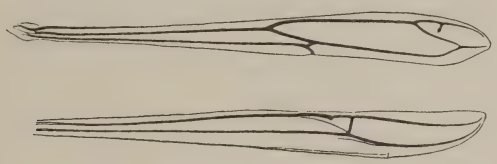
71. P. MUIRI, sp.nov. (Text fig.2).

Brownish-testaceous, more or less shaded or marked with brownish. Pilosity whitish, tufts blackish-brown. Eyes black. Second segment of antennæ blackish-brown, annulated with white. First two segments of labium blackish-brown, third pale. Tegmina brownish, variegated with white, the brown deepening almost to black in a large subdiamond-shaped spot near the middle. Abdomen mostly blackish-brown. Length 11 mill.

Navua (February; Muir); Rewa (March; Muir).

72. GARDENA PACIFICA, sp.nov. (Text figs.3-3*a*).

Allied to *G. bicolor* Distant, but much smaller and differently coloured, the pronotum much shorter. Testaceous-brown, labium and first two segments of antennæ a little paler. Middle and hind legs immaculate pale yellowish, tarsi dark fuscous. Anterior



Figs.3-3*a*.—*Gardena pacifica;* tegmen and wing.

lobe of vertex not more elevated than posterior lobe; antennæ a little longer than body, first segment shorter than abdomen, longer than second, third very short, fourth not one-half length of second. Vertex shorter than pronotum, which is about one-third longer than mesonotum. First segment of labium very short, second reaching to eyes, third reaching to fore coxæ. Fore femora twice as long as their tibiæ, with five long spines, six rather shorter and a number of very short ones. Tegmina extending a trifle beyond middle of abdomen.

♀. Antennæ not pilose.

Length 19 mill.

Rewa (November; Muir).

The pronotum in this genus is usually described as fused with the mesonotum, and consisting of two lobes; I cannot see the

expediency or correctness of this, and have termed the parts pronotum and mesonotum.

73. Ploiariodes calamine, sp.nov.

Ochraceous or ferruginous-yellow, a submedian stripe down each side of hind lobe of pronotum, these uniting apically and basally. Eyes and apical half of abdomen, etc., black. Two contiguous, opaque, white lines on pleural part of pronotum posteriorly; anterior lobe of head sometimes fuscous. Antennæ pallid ochraceous, middle part of first antennal segment fulvous or fuscous, a dark fuscous ring near apex; second segment more or less fulvous or fuscous, partly. Tegmina yellowish-testaceous with greyish-fuscous or yellow picturation. Fore femora and tibiæ testaceous, with two or three more or less well defined pale fuscous rings. Middle and hind femora testaceous, with a blackish ring near apex, and one or two narrow fuscous rings about middle. Hind lobe of head swollen, laterally rounded and narrowed behind the prominent eyes, impressed ovally longitudinally. First segment of antennæ longer than second. Hind lobe of pronotum about one-half longer than the anterior. Scutellum with two strong, erect spines. Length 6 mill.

Rewa (March-April; Muir's No.119).

This seems allied to *P. vagabundus* (Linn.).

74. P. euryale, sp.nov.

This is very closely allied to *P. rubromaculatus* Blackburn, but there are two well marked pale submedian lines, one on each side, which are subparallel, or a trifle divergent posteriorly, while these are not well defined, and are if anything convergent posteriorly in *P. rubromaculatus*. Also the eyes are more prominent in *P. euryale*, extending laterally distinctly beyond the apical margin of the hind lobe of the pronotum; while they are perhaps a little less prominent laterally than the apical margin of the hind lobe in the Hawaiian species. Length: ♂ 4; ♀ $4\frac{3}{4}$ mill.

Rewa (April, November and December; Muir).

The nymphs differ appreciably from those of the Hawaiian species, only by the larger eyes.

75. P. STHENO, sp.nov.

Distinguished by the tegminal picturation. Pale yellowish (head sometimes dark). Eyes, basal half of first segment of antennæ, first two segments of labium (and sometimes the apex of abdomen) black. Fore femora only feebly annulate with testaceous and yellowish. Tegminal veins suffusedly yellowish, large yellow spots in the cells; veins on basal third dark brown, subcostal and median continuing interruptedly so almost to apex; seven short, dark brown lines at apex. Posterior lobe of head rounded and convex; eyes large; first segment of antennæ longer than second. Pronotum feebly constricted, anterior lobe widely impressed longitudinally between two smooth, raised areas; posterior lobe a little more than one-half longer than anterior lobe. Scutellum with two erect spines. Length, ♂ $5\frac{3}{4}$ mill.

Rewa (April and December; Muir).

76. P. MEDUSA, sp.nov. (Plate iv., fig.12).

Also distinguished by the tegminal picturation. Dark fuscous, eyes black. Antennæ and legs colourless; first two segments of the former, and middle and hind femora, with two or three blackish rings; middle and hind tibiæ with two rings close to base. Fore coxæ colourless, apical third blackish; femora blackish, with two colourless rings; tibiæ colourless, with three black rings; tarsi dark. Abdomen partly dark. Basal half of tegmina colourless with a close fuscous pattern; stigma tinged with red or yellow; apical half mostly blackish-grey, with contortuplicate colourless lines marking out three or four large dark eye-spots; veins mostly a little browner than the ground-colour. Wings colourless, veins pale fuscous. Head as in *P. stheno*, second segment of labium more swollen. Length $4\frac{7}{8}$-5 mill.

Rewa (Muir).

77. LUTEVA CIRCE, sp.nov. (Text fig.4).

Somewhat allied to *L. concolor* Dohrn. Testaceous; clypeus, a narrow streak along propleura and other sparse markings on thorax, fuscous; abdomen mostly fuscous. First segment of antennæ and all the femora white and pale ferruginous in wide

alternate rings, a blackish ring near apex of second (apex itself white) segment of antennæ, third and fourth (except the narrowly white apex and base) blackish. Fore tibiæ fuscous, basally colourless; tarsi colourless, with two fuscous rings; middle and hind tibiæ white, narrowly at base, then a fuscous ring. Tegmina testaceous (veins partly tinged with red), sparsely spotted with greyish-fuscous. Eyes black, very prominent, extending farther

Fig.4.—*Luteva circe;* tegmen.

laterally than mesonotum at base. Vertex suddenly, and a little emarginately, narrowed behind them. Second segment of labium reaching middle of eyes. First segment of antennæ about as long as abdomen, and about one-third longer than second, which is nearly twice the third. Pronotum about one-fourth longer than mesonotum, narrowed towards base, but widening again just before it, the two together a little more than twice as long as head. Venation characteristic. Tegmina extending to about three-fourths of length of abdomen.

♂. First two segments of antennæ with long snow-white hairs in continuous whorls, last two with silvery-white pubescence; last tergite medially truncate, laterally elongately produced acutely. Genital segment strongly constricted medially.

Length 13½ mill.

Rewa (April and November; Muir).

The nymph in the last instar is very similar to the adult, but has smaller eyes, which do not extend laterally further than the base of the mesonotum does.

Fam. **ANTHOCORIDÆ.**

78. Anthocoris pacificus, sp.nov.

Structurally allied to *A. sylvestris* (Linn.), but different in appearance. Piceous, shining, subglabrous; second segment of antennæ and last segment of labium testaceous, rest of antennæ

more or less fuscous. Tegmina cinereo-testaceous basally; apically and the cuneus fuscate. Legs piceous; apex of fore and middle femora, fore and middle tibiæ and tarsi, hind tarsi, etc., testaceous. Head about as long as wide between the eyes, which are not nearly contiguous with pronotum. Ocelli near eyes. Antennæ distinctly longer than head and pronotum together, second segment distinctly longer than width of head, first segment extending about as far as apex of head, second segment twice and one-half as long as first, nearly one-half longer than third, which is a trifle shorter than fourth. Labium reaching fore coxæ, second segment a little longer than third. Pronotum much wider posteriorly than in front; lateral margins subsinuate; subsulcate down middle but not reaching the medially emarginate hind margin. Tegmina shortly pilose. Fore femora with four or more short bristles underneath. Length, ♀ $2\frac{3}{4}$-3 mill.

Viti Levu (November; Muir's No. 28), Rewa (December; Muir), common on *Saccharum officinarum*, doubtless preying on Aphidæ.

Fam. **MIRIDÆ**.

NESOCRYPHA, gen. nov.

Differs from *Isometopus* Fieber, by the scutellum not nearly reaching the membrane. Ovate, lightly punctured. Vertex transverse, narrower than pronotum anteriorly, narrower than an eye. Clypeus somewhat swollen. [Antennæ destroyed.] Labium extending about as far as hind coxæ(?). Pronotum transverse, wider behind than in front, anteriorly emarginate in middle, posteriorly biemarginate, lateral margins ampliate, roundly diverging. Mesonotum biemarginate posteriorly, but not bilobate. Scutellum longer than wide, posteriorly acute, not nearly reaching to apex of clavus. Tegmina and wings extending beyond apex of abdomen, the former clothed with short, rather stiff hair, and rounded laterally, embolium wide, apical margin truncate; clavus parallel-sided. Cuneus large, extending posteriorly as far as the membrane. Tegmina declivous at base of cuneus. Fore coxæ nearly as long as their femora. Hind femora

strongly incrassate, tibiæ with about ten spinelets beneath, on apical half.

79. N. CORTICICOLA, sp.nov.

Yellowish-testaceous, or pale brownish-yellow, with yellowish-brown punctures. Pronotum and mesonotum slightly, in part, suffused with yellowish-ferruginous. Ocelli and clypeus, partly, red. Ten yellowish-ferruginous specks transversely on pronotum, and the following small fuscous spots on the tegmina on each side, one at base, one at apex of clavus and corium, one at base of embolium externally and one internally, one at apex of cuneus —ten in all; also one close to posterior angle of scutellum. Eyes blackish-grey. Legs testaceous, fore tibiæ biannulate with dark fuscous; hind femora irregularly annulate medially with dark fuscous. Length, ♀ $2\frac{3}{4}$ mill.

Viti Levu (December; Muir), under bark of native fig.

80. EUCEROCORIS THETIS, sp.nov.

♂. Shining yellowish, more or less suffused with sanguineous. Eyes black. Antennæ dark fuscous, first segment and base of second dark sanguineous, base of first yellowish. Labium yellowish-testaceous, apex black. Tegmina basally and laterally more or less fuscous, cuneus and membranal veins deep sanguineous. Legs not annulate, tarsi blackish. Apical half of abdomen polished black. Head nearly as wide as hind margin of pronotum, sulculate down the middle. Labium extending just beyond middle coxæ. First segment of antennæ naked, second and third elongately pilose, fourth shortly pilose, second segment twice as long as first, one-fifth longer than third, thrice as long as fourth. Legs not, unless shortly, pilose.

Var. more or less fuscously suffused.

Length 7-$8\frac{1}{2}$ mill.

Rewa (March-April; Muir's No.93).

81. HYALOSCYTUS ELEGANTULUS Reuter, 1904, Öfv. Finsk. Förh. xlvii. No.5, p.2, fig.1.

Var. FILICICOLA, nov.

Differs from the typical form by at least the basal half of the first segment of the antennæ being ochraceous, usually the first two segments being so. The colouring of the body is somewhat variable, being often suffused with red; the pronotum may be immaculate, or the postero-lateral angles may be more or less widely fuscous. In all the specimens before me, the head is more distinctly exserted than in Reuter's figure, but I presume that this extra part is usually withdrawn into the pronotum.

Viti Levu (November; Muir's No.5); Rewa (April; Muir); Navua (February; Muir); beaten from a bracken-like fern.

82. CYRTOPELTIS(?) NICOTIANÆ, sp.nov.

Yellowish-green; eyes, clypeus, middle third of first segment, base and apex of second segment of antennæ, apical segment of labium, etc., black. Labium, legs, etc., greenish-testaceous. Tegmina pale green, with rather sparse blackish hairs; a spot at middle of apical margin of corium, apical angle of cuneus, membranal veins, etc., brownish-black. Head nearly contiguous with pronotum, collar short. First segment of antennæ extending beyond apical margin of head. Length 3 mill.

Lautoka, on Tobacco-leaves (Knowles, No.350; November, 1907).

A closely allied American form, *Dicyphus minimus* Uhler, is known as a Tobacco pest.

83. TICHORHINUS VITIENSIS, sp.nov.

Ivory-white, tinged beneath with yellowish or brownish, furnished with whitish pubescence on tegmina, etc. Vertex partly suffused, rather obscurely, with reddish. First segment of antennæ, base of second, clypeus, anterior and lateral margins of pronotum (broadly), posterior angle of scutellum, basal half of corium, base and apex (broadly) of clavus, apical half of cuneus, membranal veins, etc., sanguineous. Third and fourth segments of antennæ whitish. Wings hyaline, veins white, apical half of femora pale yellowish-brown. The hairs on the head, antennæ, etc., dark. Antennæ standing out well in front of head, second

segment one-half longer than third and fourth together. Length 4 mill.

Rewa (March; Muir).

ANTHROPOPHAGIOTES, gen.nov.

Belongs to the tribe Pilophorini. Head a little concave basally, thence convexly declivous, triangular. First segment of antennæ extending a little beyond apex of head; with the second incrassate, the latter flattened, third and fourth slender. Pronotum with a well marked collar; the suture and the rest of pronotum deeply impressed; pronotum also deeply impressed medially a little behind this, and rather feebly so about the middle, percurrently; lateral margins obtuse, concavely divergent posteriorwards; hind margin roundly emarginate. Posterior lobe of scutellum triangularly impressed. First cell of membrane very small, second elongate, posteriorly acute-angled, extending nearly to apex of tegmen. Very obscurely punctured, covered with very short, whitish pubescence. Legs normal.

84. A. THANATOPHARUS, sp.nov.

Dull black; third and fourth segments of antennæ pale fuscous. Labium, apex of tibiæ, the tarsi, etc. pale brownish-yellow. Membrane and wings smoky, veins fuscous. Antennæ with second segment nearly twice and one-half as long as first, second a little wider maximumly than first, nearly six times as long as wide, narrowing apically; [third and fourth segments shrivelled, bristly]. Labium extending beyond the third coxæ, first segment beyond base of head. Pronotum basally about one-third wider than apically. Length $4\frac{1}{4}$ mill.

Rewa (Muir).

85. CYRTORHINUS MUNDULUS (Breddin).

Periscopus mundulus Breddin, Deutsch. Ent. Zeit. 1896, 106; Van Deventer, 1906, Handb Suikerriet-Cultuur op Java, ii. 167.

Viti Levu (Muir's Nos.49 and 61, parasitised by No.35), common on *Saccharum officinarum*.

The ova are inserted in the midrib of *Saccharum officinarum*, the surface being whitened by the local decay. They are heavily parasitised.

The ultimate nymph is blood-red; antennæ and legs testaceous, more or less suffused with sanguineous.

Nesosylphas, gen. nov.

Has much the appearance of a large, smooth *Disphinctus*, but is a true Capsine, allied to *Hyalopeplus* Stal, and *Malacopeplus* Kirkaldy. Head a little wider than an eye, transverse between eyes, sulcate medially, horizontal in front of eyes, which are a little emarginate basally, not touching pronotum, their interolateral margins diverging a little towards apical margin of vertex. Antennæ articulated contiguous to eyes at apex of vertex; first segment one-half longer than vertex, somewhat incrassate and curved; second about thrice as long as first; third about as long as first, thinner than second; fourth less than half third, very thin. Labium extending to hind coxæ. Head and eyes much wider than anterior margin of pronotum. Pronotum with a strong collar, which is about as long as width of second segment of antennæ towards apex of the latter; shortly behind this the pronotum is strongly constricted, the lateral margins behind this rounded and strongly diverging. This anterior lobe is about twice as long as the collar and very little wider;* posterior lobe about twice as long as collar and anterior lobe together; posterolateral angles subacute and rather prominent, extending distinctly beyond base of tegmina laterally. Posterior lobe also roundedly raised. Head and anterior lobe of pronotum smooth and shining; posterior lobe minutely and very feebly rugose; scutellum smooth, dull, disk flat. Odoriferous orifices subauriculate. Tegmina not punctured, subhyaline, venation as in *Hyalopeplus*. Abdomen smooth and shining.

---

* I use the terms "long" and "wide" with regard to the longitudinal axis of the insect.

86. N. PACIFICA, sp.nov.

Brownish-yellow or yellowish-brown. Eyes, apical third of second segment of antennæ, apical three-fourths of third, and all the fourth, a median spot on anterior margin of scutellum (the anterior part showing through the pronotum), postero-lateral angles of pronotum, black or blackish. First segment of antennæ and basal two-thirds of second dark ferruginous-red. A suffused spot near apical margin, in the middle, of corium, basal three-fourths of radial vein, commissure, membranal veins, etc., dark fuscous or blackish-grey; cuneus dark red. Femora speckled with dark brown. Tergites subsanguineous. Length $5\frac{1}{2}$ mill.

Rewa (February; Muir).

87. NOTOSTIRA PACIFICA, sp.nov.

Apparently allied to *N. doddi* (Distant), but the second segment of the antennæ is much longer than the hind tibiæ. Head with a sanguineous stripe down middle; pronotum trivittate with sanguineous, the middle vitta being divided by a pale line, vitta and line being continued to posterior angle of scutellum. Tegmina lined with sanguineous. (These sanguineous lines fade to greenish-fuscous or pale fuscous). Colour otherwise apparently as in *N. doddi*. Second segment of antennæ thrice as long as first and one-seventh longer than third. Labium reaching to middle coxæ. First segment of hind tarsi longer than third. Length 4-5 mill.

Viti Levu (March; Muir); Ba (January; Muir); Rewa (Muir).

NESODAPHNE, gen.nov.

Superficially like *Phytocoris*, but the antennæ are nude, or nearly so. Differs from all the Capsini known to me by the tufts of hair on the pronotum and scutellum. Elongate; head elongate, subdeclivous, marginate behind, eyes widely diverging towards apex. First segment of antennæ extending well in front of apex of head, rather longer than third, about three-fourths of second; fourth very short. Eyes extending far beyond anterior margin of pronotum laterally; posterior margin of pronotum more than

twice as wide as anterior margin; punctured and covered with long tufts of hair. Scutellum with two or three tufts. Labium extending to base of middle coxæ. Tegmina explanate laterally.

88. N. KNOWLESI, sp.nov.

Head, sterna, etc., testaceous. Antennæ dark fuscous; basal half and apex of first; base, a middle ring, and apex of second; apices of third and fourth; whitish-testaceous. Pronotum pale purplish-brown, two subanterior spots, collar, and posterior margin (very narrowly) pale. Scutellum, clavus and interior third of corium, dark purplish-brown; posterior angle of scutellum greenish-yellow. Rest of corium dark fuliginous, spotted with hyaline. Sternites yellowish-green. Legs multiannulate with fuscous. Length 5 mill.

Lautoka (Knowles, No.349), on *Artocarpus incisa* and Tobacco-leaves.

I hope to ampliate this diagnosis later and figure the interesting Mirid.

Fam. **CICADIDÆ.**

89. CYCLOCHILA AUSTRALASIÆ (Donovan), Goding & Froggatt, 1904, Proc. Linn. Soc. N. S. Wales, xxix. 569.

Recorded by me (1907, Bull. Ent. Haw. Sugar Plant. Assoc. iii. 17), but Mr. Froggatt tells me that he thinks that the individuals were accidental visitors, or introduced into Fiji, as this species has a very limited range in Australia.

90. MACROTRISTRIA ANGULARIS (Germar).

Cicada angularis Goding & Froggatt, 1904, *op. cit.* 580.

The same remarks apply to this as to the former.

91. CICADA KURUDUADUA Distant, Trans. Ent. Soc. London, 1881, 645; Waterhouse, 1882, Aid Ident. Ins. i. Pl. C.

"Fiji."

92. C. KNOWLESI Distant, 1907, Ann. Mag. Nat. Hist.(7) xx. 413.

"Fiji."

93. COSMOPSALTRIA VITIENSIS (Distant).

Sawda(?) *vitiensis* Distant, 1906, Entom. xxxix. 12.

"Fiji."

94. Diceropyga distans (Walker), Distant, 1906, Cat. Hom. i. 64.
Rewa (Muir); Ovalau (Walker).

95. D. stuarti (Distant).
Cosmopsaltria stuarti Distant, Proc. Zool. Soc. London, 1882, 125, Pl.vii. f.2; Kirkaldy, 1907, *op. cit.* iii. 17.
Rewa (March; Muir).

96. Cicadetta tympanistria Kirkaldy, 1907, *op. cit.* 18, Pl.i. figs. 1-3.
Rewa (Muir).

Fam. **CERCOPIDÆ.**

97. Nesaphrestes dreptias Kirkaldy, 1907, *op. cit.* 21.
Rewa (Muir), on a native tree in the bush.

98. N. ptysmatophilus Kirkaldy, *l.c.*
Rewa (Muir).

99. Nesaphrogeneia vitiensis Kirkaldy, 1907, *op. cit.* 20 and 22.
Rewa (Muir).

Fam **TETTIGONIIDÆ.**

100. Eurinoscopus hamadryas Kirkaldy, 1907, *op. cit.* iii. 39.
Rewa (Muir).

101. Hybrasil brani Kirkaldy, 1907, *l.c.* Pl.ii. f.18.
Rewa (Muir).

102. Dryadomorpha lotophagorum Kirkaldy, 1907, *l.c.*
Rewa (Muir).

103. Xestocephalus pallidiceps Kirkaldy, 1907, *op. cit.* 51 (with vars. contortuplicata and decemnotata).
Rewa (Muir).

104. X. purpurascens Kirkaldy, *op. cit.* 52.
Rewa (Muir).

105 X. vitiensis Kirkaldy, *op. cit.* 51.
Rewa (Muir).

106. Nephotettix plebeius Kirkaldy, 1906, *op. cit.* i. 331; 1907, *op. cit.* iii. 54, Pl.ii. figs.3-4.
Rewa (Muir).

107. Deltocephalus histrionicus Kirkaldy, 1907, *op. cit.* iii. 57.
Viti Levu, arboreal (Muir).

108. Conosanus hospes Kirkaldy.
Phrynomorphus hospes (Kirkaldy) Kirkaldy, 1907, *op. cit.* iii. 60, Pl.i. figs,13-17 (nymph on f.13).
Lowlands of Fiji. Also Eastern Australia and the Hawaiian Isles, on *Cynodon dactylon*, etc. The metamorphoses have been partially described and figured (*l.c.*).

109. Allygus lotophagorum Kirkaldy, 1907, *op. cit.* iii. 62.
Rewa and Ba (Muir).

110. Limotettix filicicola Kirkaldy, 1907, *op. cit.* iii. 63.
Rewa (Muir), on Tree-ferns.

111. Nesosteles hebe Kirkaldy, 1906, *op. cit.* i. 343, Pl.xxxii. fig.8.
Rewa and Navua (Muir); Suva, on leaves of *Saccharum officinarum* (Knowles, No.157). Also Queensland and the Hawaiian Isles.

112. Cicadula vitiensis Kirkaldy, 1906, *op. cit.* i.; 1907, iii. p.68.
Rewa (Muir).

113. C. hyadas Kirkaldy, 1907, *op. cit.* iii. *l.c.*
Rewa (Muir).

114. C. euryphaessa Kirkaldy, 1907, *op. cit.* 68.
Rewa and Navua (Muir), on *Saccharum officinarum*, and on a native tree.

115. Erythroneura doris Kirkaldy, 1907, *op. cit.* 69.
Rewa (Muir).

116. E. lalage Kirkaldy, 1907, *op. cit.* 70.
Rewa (Muir).

117. E. leucothoe Kirkaldy, 1907, *l.c.*
Navua (Muir).

118. E. rewana Kirkaldy, 1907, *op. cit.* 71.
Rewa (Muir).

119. Tharra kalypso Kirkaldy, 1907, *op. cit.* 76.
Rewa (Muir).

120. T. ogygia Kirkaldy, 1907, *l.c.*
Rewa (Muir).

121. T. kassiphone Kirkaldy, 1907, *op. cit.* 75 and 77.
Rewa (Muir).

122. T. nausikaa Kirkaldy, 1907, *l.c.*
Rewa and Navua (Muir).

123. T. sp.(?) Kirkaldy, 1907, *op. cit.* 78, Pl.ii. figs.14-15 (nymph).
Rewa (Muir).

124. Muirella oxyomma Kirkaldy, 1907, *op. cit.* iii. 74 and 79, Pl.ii. figs.21-22.
Rewa and Navua (Muir). Nymphs figured, Pl.i. figs.10-11.

125. Tettigonia albida Walker, Kirkaldy, 1906, *op. cit.* 1.
Rewa (Muir). All over the tropics of the Old World.

Fam. **MEMBRACIDÆ.**

Membracidæ have not yet been recorded from Fiji.

Fam. **POECILLOPTERIDÆ.**

126. Vanua vitiensis Kirkaldy, 1906, i. 416, Pl.xxvii. figs.7-9 (nymphs on Pl.27, figs.6-7); 1907, iii. 97.
Rewa (Muir & Koebele).

127. Plestia marginata (Montrouzier) Melichar, 1898, Ann. Mus. Wien, xiii. 294, Pl.xii. fig.17; and Pl. xiv. fig.1.
Rewa (Muir & Koebele). Also from "Australia" and Lifu.

128. Euricania tristicula (Stal) Melichar, *op. cit.* 259 and 265, Pl.xi. fig.7; and Pl.xiii. fig.14.
Rewa (Koebele & Muir); Ovalau (Melichar).

Fam. **ISSIDÆ.**

129. Tylana intrusa Melichar.
Ovalau (Melichar).

130. T. ORIENTALIS Melichar.
Ovalau (Melichar).

131. O. PICEUS (Walker) Melichar.
Viti Levu. Also from Papua and Aru.

Fam. **FULGORIDÆ.**

132. OLIARUS TASMANI Kirkaldy, 1907, *op. cit.* iii. 108.
Rewa (Muir).

133. O. LUBRA Kirkaldy, var. VITIENSIS Kirkaldy, 1907, *op. cit.* 109, Pl.viii. figs.7-9.
Rewa, Ba and Navua (Muir), on *Artocarpus incisa*. The type-form is from Australia.

134. O. SACCHARICOLA Kirkaldy, 1907, *l.c.*
Rewa (Muir), on *Saccharum officinarum*.

135. URVILLEA MELANESICA Kirkaldy, 1907, *l.c.*
Rewa (Muir).

136. NESOCHARIS KALYPSO Kirkaldy, 1907, *op. cit.* iii. text f.1.
Rewa (Muir).

137. MYNDUS (?) VITIENSIS Kirkaldy, 1907, *op. cit.* iii.
Navua (Muir).

138. LEIRIOESSA VITIENSIS Kirkaldy, 1907, *op. cit.* 112.
Viti Levu (Muir), on a native tree in the bush.

139. DYSTHEATIAS BEECHEYI (and var. FUSCATA) Kirkaldy, 1907, *op. cit.* 113.
Rewa (Muir).

140. QUIROSIA VITIENSIS Kirkaldy, 1907, *op. cit.* 115.
Rewa (Muir).

141. NESOCHLAMYS VITIENSIS Kirkaldy, 1907, *op. cit.* 115.
Rewa and Navua (Muir).

142. PHENELIA BICUNEATA Kirkaldy, 1907, *op. cit.* 117.
Rewa (Muir).

143. P. TRISTIS Kirkaldy, *l.c.*
Rewa (Muir).

144. CALLINESIA PULCHRA Kirkaldy, *op. cit.* 118, Pl.ix. fig.17.
Rewa (Muir).

145. C. ORNATA Kirkaldy, *l.c.*
Rewa (Muir).

146. C. PUSILLA Kirkaldy, *op. cit.* 118, 119.
Rewa (Muir).

147. C. VENUSTA Kirkaldy, *op. cit.* 118, 119.
Rewa (Muir).

148. CALLICHLAMYS MUIRI Kirkaldy, *op. cit.* 120, Pl.ix. figs.20-1.
Rewa (Muir).

149. C. UNDULATA Kirkaldy, *l.c.*
Rewa (Muir).

Fam. **ASIRACIDÆ.**

150. UGYOPS VITIENSIS Kirkaldy, *op. cit.* 127.
Viti Levu, arboreal (Muir).

151. MELANESIA PACIFICA (and var. STRIGATA) Kirkaldy, *op. cit.* 129, Pl.xvii. figs.13, 14.
Rewa and Navua, arboreal (Muir).

152. PEREGRINUS MAIDIS (Ashmead) Kirkaldy, 1907, *op. cit.* 132, Pl.xii. figs. 7-8; and Pl.x. fig.14.
Rewa (Koebele & Muir); Lautoka (Knowles, No.347), on *Zea mays* and grass; widely disseminated.

153. DICRANOTROPIS ANDERIDA Kirkaldy, *op. cit.* 133.
Rewa, Ba and Navua, on grass. Also from Australia.

154. D. KOEBELEI Kirkaldy, 1906, *op. cit.* i. 408; and 1907, iii. 133-134, Pl.vii. figs.9-10; Pl.xvii. figs.8-9.
Rewa (Koebele & Muir).

155. PERKINSIELLA PSEUDOMAIDIS Kirkaldy, 1906, i. 408; 1907, iii. 136, Pl.xii. figs.1-3.
Viti Levu (Muir), on *Saccharum officinarum.* Also from Australia.

156. P. VITIENSIS Kirkaldy, 1906, i. 405-406; 1907, iii. 137, Pl.xii. figs.9-10.
Levuka (Koebele).

157. STENOCRANUS PACIFICUS Kirkaldy, 1907, *op. cit.* 139, Pl.xv. figs.4-5.
Rewa, Navua and Ba (Muir), on *Saccharum officinarum* and grass.

158. SARDIA PLUTO (Kirkaldy).
Hadeodelphax pluto Kirkaldy, 1906, i. 410; 1907, iii. 140, Pl.xvii. fig.12 (with var. *pallidior*).
Rewa, Navua and Ba (Muir & Koebele). Also from Australia and Ceylon.

159. MEGAMELUS PROSERPINA Kirkaldy, 1907, *op. cit.* 147, Pl.x. figs.5-7; xii. figs.19-21.
Suva (Muir).

160. DELPHAX DRYOPE Kirkaldy, 1907, *op. cit.* 152, Pl.xvi. figs. 12-13.
Rewa (Muir). Also Queensland.

161. D. MATANITU Kirkaldy, 1907, *op. cit.* 155, Pl.xvi. figs 4-5; Pl.xviii. fig.15.

162. D. DISONYMOS Kirkaldy, 1907, *op. cit.* 156, Pl.xviii fig.4.
Rewa and Suva (Muir).

163. D. OCHRIAS Kirkaldy, 1907, *op. cit.* 157.
Rewa (Muir). Also Australia.

164. D. PUELLA (Van Duzee) Kirkaldy, 1907, *op. cit.* 160, Pl.xv. figs.1-3.
Suva (Muir). Also Australia and North America.

165. D. EUPOMPE Kirkaldy, 1907, *op. cit.* 162, Pl.x. figs.3-4; xii. figs.16-18.

Fam. **DERBIDÆ.**

166. NISIA ATROVENOSA (Lethierry) Kirkaldy, 1907, *op. cit.* 165.
Rewa, Navua and Ba (Muir & Koebele). Also Australia, the Orient, the Ethiopian Region, etc.

167. Suva koebelei Kirkaldy, 1906, i. 428; 1907, iii. 165, Pl.ix. figs.14-16.
Suva (Koebele).

168. Phaciocephalus miltodias Kirkaldy, 1907, *op. cit.* 167-8, Pl.xix. fig.20.
Rewa, arboreal (Muir).

169. P. minyrias Kirkaldy, *op. cit.* 167, 168.
Rewa (Muir).

170. P. nesodreptias Kirkaldy, *op. cit.* 167.
Rewa (Muir).

171. P. nesogonias Kirkaldy, *l.c.*
Rewa (Muir).

172. P. pullatus Kirkaldy, *op. cit.* 167, 168.
Rewa, arboreal (Muir).

173. P. vitiensis Kirkaldy, 1906, i. 428; 1907, iii. Pl.xix.figs.12-14.
Suva, arboreal (Koebele)

174. Rhotana halosydne Kirkaldy, *op. cit.* iii. 169.
Rewa (Muir).

175. Levu vitiensis Kirkaldy, 1906, i. 434.
Suva and Rewa (Muir & Koebele).

176. Niphadodite insulicola Kirkaldy, 1907, iii. 170.
Viti Levu, arboreal (Muir).

177. Pyrrhoneura saccharicida Kirkaldy, 1906, i. 434; 1907, iii. 170, fig., and Pl.xx. figs.6-7.
Rarawai and Rewa, on *Saccharum officinarum*, and native trees in the bush (Koebele & Muir); Lautoka, on leaves of *Artocarpus incisa*, and one on leaves of Coconut almost under the Breadfruit (Knowles, No.353).

178. P. citharista Kirkaldy, 1907, *op. cit.* 171, Pl.xx. figs.1-2.
Viti Levu, arboreal (Muir).

179. P. vitiensis Kirkaldy, *l.c.*
Rewa (Muir).

180. Nesocore fidicina Kirkaldy, 1907, *op. cit.* 172.
Rewa (Muir).
The nymph occurs under the bark of old trees, and is figured on Pl.xviii., figs.9-10.

181. Nesoniphas insignissima Kirkaldy, 1907, *op. cit.* 175, Pl.xix. figs.10, 11.
Rewa (Muir), on *Zingiber Zerumbet.*

182. Lyricen imthurni Kirkaldy, 1907, iii. 164 and 172, Pl.xix. figs.1-3; xx. figs.3-5.
Rewa (Muir).

183. Muiria stridula Kirkaldy, 1907, *op. cit.* 175 and 177, Pl. xix. figs.4-5; xx. figs.10-13.
Rewa (Muir), on a palm.

184. Sikaiana nesiope Kirkaldy, 1907, *op. cit.* 178, Pl.xviii.fig.13.
Rewa (Muir).

185. Nesophantasma vitiensis Kirkaldy.
Phantasmatocera vitiensis Kirkaldy, 1906, i. 431, Pl.xxviii. figs.1-3.
Viti Levu (Koebele).

186. Swezeyia lyricen Kirkaldy, 1906, i. 430; 1907, iii. Pl.xix. figs.15-19.

Fam. **CHERMIDÆ.**

187. Trioza vitiensis Kirkaldy, 1907, P. Hawaiian Ent. Soc. i.
Rewa (Muir); Lautoka, on leaves of *Artocarpus incisa* (Knowles, No.348)

188. T. vanuæ Kirkaldy, 1907, *op. cit.*
Rewa (Muir).

Nesiope, gen.nov.

The form of the tegmen and the venation seem characteristic. Vertex flat, wide, slightly declivous, lateral margins of vertex very slightly diverging towards apex. Eyes large. Pronotum and dorsulum short, mesonotum rather large. Tegmina elongate.

189. N. ORNATA, sp.nov. (Text fig.5).

Testaceous, eyes and ocelli red. Apices of antennal segments dark fuscous. A central pale line down dorsulum and mesonotum, very narrowly bordered with black, sides of mesonotum broadly ferruginous, with two pale, curved, very narrow lines. Tegmina hyaline, with brownish spots as shown in the figure.

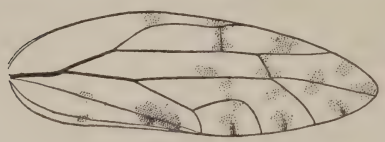


Fig.5.—*Nesiope ornata;* tegmen.

Length 4 mill.

"Fiji" (my collection).

Although my material is very poor, I have briefly diagnosed this pretty little species, which I think can be thus identified. Mr. Muir has also captured two specimens, but in very bad condition (Rewa).

Fam. APHIDÆ.

I am not aware of any Fijian Aphid-records.

Fam. ALEYRODIDÆ.

190. ALEYRODICUS HOLMESII (Maskell).

Aleurodes holmesii Maskell, 1896, Trans. N. Zeal. Inst. xxviii. 435, Pl.xxxi. pt.2.

"Fiji," on *Psidium.*

191. ALEYRODES BERGII (Signoret) Kirkaldy, 1907, Bull. Agr Hawaii Ent. ii. 48 (bibl.).

Rewa; Ovalau, Levuka; also Java and Mauritius. On *Saccharum officinarum.*

192. A. CALOPHYLLI Kotinsky, 1907, Bull. Agr. Hawaii Ent. ii. 98, Pl.i. fig.5.

Ovalau, Levuka, on *Calophyllum inophyllum.*

193. A COMATA (Maskell) Kirkaldy, 1907, *op. cit.* 150 (bibl.).

"Fiji."

194. A. FIJIENSIS Kotinsky, 1907, *op. cit.* 100, Pl.i. fig.6.

Rewa (Muir).

195. A. LEAKII (Peal) Kirkaldy, *op. cit.* 59 (bibl.).
Suva (Muir). Also India, on *Indigofera tinctoria* and *I. arreca.*

196. A. SACCHARI (Maskell) Kirkaldy, *op. cit.* 69 (bibl.)
"Fiji," on *Saccharum officinarum* and grass.

Fam. **COCCIDÆ.**

(For full references and food-plants, *cf.* Fernald, 1903, Bull. Massachusetts Exp. Sta. 88.)

197. ICERYA PURCHASI (Maskell) Fernald, 25.

198. ANTECEROCOCCUS BRYOIDES (Maskell) Fernald, 58.

199. TRECHOCORYS CALCEOLARIÆ (Maskell).
Pseudococcus calceolariæ Fernald, 98.

200. COCCUS LONGULUS (Douglas) Fernald, 171.

201. AULACASPIS ROSÆ (Bouché) Fernald, 236.

202. ASPIDIOTUS VITIENSIS (Maskell) Fernald, 281.

203. CHRYSOMPHALUS AURANTII (Maskell) Fernald, 287.

204. C. DICTYOSPERMI var. PINNULIFERA (Maskell) Fernald 290.

205. LEPIDOSAPHES BECKII (Newman) Fernald, 305.

EXPLANATION OF PLATE IV.

Fig. 1.—*Orthoea vincta;* nymph.
Fig. 2.— ,, ,, brachypterous adult.
Fig. 3.— ,, ,, tegmen of macropterous adult.
Fig. 4.—*Brachylybas variegatus.*
Fig. 5.— ,, ,, the same in profile.
Fig. 6.— ,, ,, odoriferous orifice.
Fig. 7.—*Ontiscus vitiensis.*
Fig. 8.—*Nesocypselas dicysta.*
Fig. 9.— ,, ,, the same in profile.
Fig. 10.—*Holophygdon melanesica.*
Fig. 11.— ,, ,, the same in profile.
Fig. 12.—*Ploiariodes medusa;* tegmen.

REVISION OF THE GENUS *SEIROTRANA*, TOGETHER WITH DESCRIPTIONS OF NEW SPECIES OF OTHER AUSTRALIAN COLEOPTERA.

By H. J. Carter, B.A., F.E.S.

Seirotrana Pascoe.

Journ. of Ent. ii. 1866, p.483.

TENEBRIONIDÆ.

In 1866 Pascoe formed the genus *Seirotrana* for the reception of *Adelium catenulatum* Boisd., describing its distinguishing characters in fifteen words, "Characteres ut in *Adelio*; sed elytra prothoraci arcte applicata. Antennæ articulo tertio duobus sequentibus breviore."

It is a pity that Pascoe did not add Blessig's excellent characters for differentiating this genus from *Adelium*, since the latter's third class of Adelia, consisting of *A. parallelum*, *A. elongatum* and *A. catenulatum* are specially described as having "the abdominal process* quite margined, *abruptly truncate*"; and he adds, "they are of elongated form, the intervals on the elytra are alternately shallow and elevated." Another character, which though not common to all the species, is true of thirteen out of the twenty species herein specified, is the crenulated sides of the prothorax.

A better character for differentiating *Seirotrana* from *Adelium* and from *Coripera* is the form of the epipleura, which in *Coripera* is nearly vertical, in *Adelium* rounded or much more acutely joined to the elytra, in *Seirotrana* it is narrower and intermediate,

* I have already spoken of this in my revision of Adelium as the "intercoxal process."

in its application to the elytra between the two former genera, the epipleural fold being subobsolete.*

The interrupted costæ on the elytra cannot be taken as a distinctive character, since it occurs in many species of *Adelium*; while in five species of *Seirotrana*, namely, *S. mastersi*, *S. strigipennis*, *S. crenicollis*, *S. denticollis*, and *S. uniformis* it is replaced by a quite different sculpture.

I have seen the types of all the described species, except of *S. catenulata* Boisd., *S. elongata* Erichs., *S. parallela* Germ., *S. congesta* Pasc., *S. integricollis* Haag-Rut., and *S. geniculata* Haag-Rut., but I have little doubt of my identification of the above.

S. catenulata Boisd., is the commonest species in New South Wales, and is found in all our collections. I have taken it plentifully near Sydney, Newcastle, and in the Illawarra district. Its chief variation seems to lie, as with other crenulated-sided forms, in the greater or less dentation or crenulation; and I am inclined to think, from my observation of the less crenulate forms, (*e.g.*, *S. vicina* Carter, *S. proxima* Pasc., that the female has the more strongly marked incisions on the sides of the prothorax.

S. elongata Erichs., *S. integricollis* Haag-Rut., and *S. paralella* Germ., are allied forms that may be confounded; but are, I think, readily distinguished by the following characters—that is if my identification be correct.

S. integricollis Haag-Rut.—(1) Colour shining dark bronze. (2) Marginal border of pronotum thick. (3) Anterior angles moderately advanced. (4) Elytral costæ fairly distinct. (5) Wider form.

S. elongata Erichs.—(1) Colour black-bronze. (2) Marginal border fine. (3) Anterior angles less advanced. (4) Elytral costæ subobsolete. (5) Form intermediate.

S. parallela Germ.—(1) Colour black-bronze. (2) Marginal border fine. (3) Anterior angles prominent. (4) Elytral costæ elevated. (5) Narrower form.

---

* See Pascoe's note, Ann. Mag. Nat. Hist. 1869, pp. 43, 44.

My specimens of *S. integricollis* come, one from Wee Waa, New South Wales, and two from Gayndah given me by Mr. Masters (the latter is the locality given by Haag-Rutenberg).

My two specimens of *S. elongata* were taken by myself near Launceston, Tas. Erichson's species is Tasmanian.

I have a number of specimens of *S. parallela* from Adelaide (Germar's locality); also from Bullarook, Grampians and Apollo Bay, Vic., a district also noted by Blessig for this species.

S. geniculata Haag-Rut.—Two specimens, taken by myself on the hills near Wollongong, but it is known from other parts of New South Wales, a specimen in the Macleay Museum being labelled "Blue Mountains." Though described as black, fresh specimens are really a dark bronze colour, subject to some variation; one of my specimens is distinctly bronze.

S. femoralis Macl.—The type from Gayndah in the Australian Museum is unique. It is very distinct from *S. geniculata* Haag-Rut., in its small size and light colour.

S. proxima Pasc.—Of the two specimens in the British Museum the type has the sides of the prothorax more dentate than the other specimen. I have specimens from Monaro, N.S.W., and from Victoria.

S. congesta Pasc.(*Adelium congestum* Pasc.) = *S. parallela* Germ. —From the description I had little doubt that this *was* a Seirotrana. By some chance I neglected to note the type in the British Museum, but in answer to my enquiries Mr. C. J. Gahan has courteously examined the type for me and writes, "*A. congestum* Pasc., is clearly identical with *A. parallelum* Germ."

S. repanda Pasc.(*Adelium repandum* Pasc.) = *S. dispar* Blackb. —I have closely compared the type of *S. dispar*, kindly lent me by Mr. C. French, with cotypes of *A. repandum* from Gayndah, given me by Mr. Masters, who sent the type to Pascoe, and find them identical. I must express my doubt as to the correctness of the locality given by Mr. Blackburn for this species (viz., Victoria). The species has a wide range from Inverell, N.S.W., to Gayndah; but from a large collection of Seirotrana I have seen

nothing like it from Victoria. The type of *S. dispar* has no locality-label, and it is just possible that Mr. French may have mistaken the locality.

It is strange that Pascoe should have described species of his own genus in the same papers as those in which he described both *A. congestum* and *A. repandum*, without noticing the very distinctions by which he separates that genus from *Adelium*. Thus under *A. repandum* he notes "in the closeness of its prothorax to the elytra, and also in habit, slightly approaching the genus *Coripera*." Mr. Blackburn may well be excused from not suspecting that Pascoe would not recognise his own genus.

S. major Blackb.—Two specimens in the Macleay Museum bear this name, from Tamworth. I have also one specimen from Cape Hawke district which corresponds to these, and to the description (except in colour). The description gives "ænea," while in the note following, Mr. Blackburn says "of a bright (almost nitid) brassy colour." The three specimens mentioned above are shiny bronze, but scarcely "brassy," and are certainly darker than *S. mastersi* Macl. It is probable that the type was unusually bright. Mr. Blackburn has been misled by Pascoe's description of *S. mastersi* in supposing that *S. major* can be differentiated from that species by its crenulate prothorax alone. (See notes on *S. mastersi* Pasc., *infra*).

A strong character in the species I take to be *S. major* is the remarkably coarse and close puncturation of the pro- and metasternum; while the fore femora are covered with smaller punctures, and the epipleuræ are coarsely but more distantly punctured. From the specimens before me the most apparent distinctions between *S. major* and *S. mastersi* are as follows:—

S. major Blackb.—Colour shining dark coppery bronze (varying to lighter). Prothorax: disc strigose, coarsely punctate, *without* larger punctures; anterior angles more acute. Sternum densely and coarsely punctate.

S. mastersi Pasc.—Colour brilliant coppery-bronze. Prothorax: disc finely punctate, *with* larger scattered punctures; anterior angles less acute. Sternum finely punctate.

S. mastersi Pasc.—The description of this species is misleading from faults both of omission as of commission. I have three specimens from Queensland which I have compared with the type, and which correspond to the Macleay Museum specimens.

The very brief description (Ann. Mag. Nat. Hist. 1870) gives the margin of prothorax as entire, "marginibus integris," and in the note following "the margins with a raised linear border." This border is certainly not interrupted, but is distinctly wavy, and in some cases sufficiently so to be called "toothed." There is no material difference in this respect between *S. major* and *S. mastersi*; in both species the crenulation is faint in the anterior portion, but more distinct near the base. The most noticeable omission by Pascoe is the failure to note the small shining pustules placed (as in *S. major* Blackb.) on the elytral interstices between the rows of punctures. These are smaller and less obvious than in *S. major*, but are sufficiently distinct. Thus it will appear that the only evident characters by which we can distinguish these two species are those tabulated above. These differences are, however, very considerable, and especially in the widely different puncturation of their respective pro- and metasterna, *S. mastersi* having a much finer and less pronounced sculpture. The puncturation of their epipleuræ is also very different. In *S. mastersi* the punctures are confined to the lower part, *i.e.*, nearest the abdomen, leaving a smooth surface nearest the elytra; in *S. major* the punctures are irregularly scattered over the whole epipleuræ, with an irregular line of them immediately next the elytral borders, while the border is itself more strongly marked and reflexed at the humeral angles in *S. mastersi* than in *S. major*.

S. strigipennis Bates.—I have a cotype from the British Museum labelled "Adelaide R."

S. punctifera Macl.—Two cotypes from Gayndah, obtained through the courtesy of Mr. Etheridge and of Mr. Rainbow of the Australian Museum.

S. nasodermoides Pasc.—Two cotypes from Wide Bay, also from the Australian Museum.

The total number of species thus known to me is twenty, and these can be readily divided into two groups.

i. Those having the sides of prothorax crenulate or dentate, and with the disc of pronotum more or less vermiculate-punctate without larger punctures.

ii. Those having the sides of prothorax entire, and the disc of pronotum with larger punctures irregularly placed among smaller.

To this arrangement *S. mastersi* Pasc., is a solitary exception, since by its crenulate-sided prothorax it belongs to group i.; while in its having larger punctures on its pronotum it should be in group ii. Its close affinity to *S. major*, noticed above, makes it more naturally belong to group i.

The following tabulation will be of assistance in determining the species.

Group i. Sides of prothorax crenulate or dentate.
A_1. Disc of pronotum more or less vermiculate-punctate, without larger punctures (except in *S. mastersi* Pasc.).
B_1. Elytra with alternate intervals catenulate.
C_1. Size large, more than 15 mm. long.
1. D_1. Pronotum strigose without larger punctures...*major* Blackb.
2. D_2. Pronotum punctulate with larger punctures ...*mastersi* Pasc.
C_2. Size smaller, less than 15 mm.
3. E_1. Colour black, legs concolorous.....*catenulata* Boisd.
E_2. Femora yellow at apex.
4. F_1. colour black, or deep bronze.....*geniculata* Haag-Rut.
5. F_2. Colour bright copper, size much smaller....*femoralis* Macl.
G. Colour dark bronze, subnitid.
6. H_1. Form more convex.....*proxima* Pasc.
H_2. Form depressed.
7. I_1. Suture at apex flat.....*vicina*, n.sp.
8. I_2. Suture at apex nodulose.....*vertebralis*, n.sp.
B_2. Elytra with alternate intervals scarcely interrupted.....
9. *monticola* Blackb.
B_3. Elytra with all intervals subcostate and crenulate.....
10. *strigipennis* Bates.
A_2. Disc of pronotum nodulose.
J. Colour brown.
11. K_1. Edge of prothorax crenulate.....*crenicollis* Pasc.
12. K_2. Edge of prothorax strongly dentate.....*denticollis*, n.sp.
13. A_3. Disc of pronotum longitudinally grooved.....*nosodermoides* Pasc.

Group ii. Sides of prothorax entire.

A. Disc of pronotum with large punctures irregularly placed.

B_1. Colour olive-bronze, shining.

C_1. Size large, form convex.

14. D_1. Elytra without elevated costæ.....*punctifera* Macl.

C_2. Size much smaller.

D_2. Elytra with interrupted costæ faintly elevated.

E_1. Form broad and flat.

15. Sides of prothorax moderately rounded.....*repandum* Pasc.
dispar Blackb.

E_2. Form more elongate and parallel.

16. G_1. Border of pronotum thick.....*integricollis* Haag-Rut.

B_2. Colour bronze-black.

17. G_2. Border of pronotum fine.....*elongata* Erichs.

D_3. Elytra with interrupted costæ strongly elevated.. ..

18 *parallela* Germ.
congesta Pasc.

B_3. Colour black.

19. H_1. Elytral costæ elevated only at apex.....*simplex* Blackb.

20 H_2. Elytra uniformly striate-punctate.....*uniformis*, n.sp.

The following are the descriptions of the new species in the above table :—

SEIROTRANA VERTEBRALIS, n.sp.

Oval-depressed, bronze, subnitid, tarsi red, legs, antennæ and palpi reddish-brown.

Head rugosely punctate on front, more finely punctate on epistomal ridge, the latter only slightly raised above frontal surface. Antennæ short and stout; third joint much shorter than fourth and fifth combined, apical joint ellipsoidal and little longer than preceding, joints gradually thickening from base to apex. *Prothorax* slightly convex, without foliate margins, half as broad again as long ($3 \times 4{\cdot}5$ mm.), edge with border raised and slightly crenulated. Anterior angles obtuse and slightly produced forward. Sides very gradually rounded, sinuous near base. Hind angles rectangular. Front and base sinuate, the latter having scutellar region advanced, border in both narrower than at sides. Disc densely but finely subvermiculate-punctate, the slight vermiculation consisting of raised shining lines more or less longitudinal; sculpture coarser towards the sides. *Elytra* oval, about twice

and one-half as long as and a little wider than prothorax; shoulders slightly obtuse, scutellum widely transverse and elliptic, very finely punctate. Each elytron lineate-punctate with ten lines of regular punctures; alternate intervals, viz., third, fifth, seventh and ninth with raised shining elongate nodules which become shorter towards apex. The sutural lines themselves nodulose towards apex only. Epipleuræ coarsely punctate. Abdomen pitchy-brown and very finely punctate. Intercoxal process raised and truncate. Front tibiæ moderately bowed, other tibiæ straight. *Dimensions*—15 × 5 mm.

Hab.—Blackheath, Blue Mountains (H. J. Carter).

A very distinct species. In general shape somewhat like *S. parallela* Germ., but differing in the absence of large punctures on pronotum, its crenulate sides and more oval form. The nodulose suture is a strong distinctive character, while the basal portion of the elytra is free from any sign of nodulation.

SEIROTRANA VICINA, n.sp. (Text fig. 1).

Elongate-ovate, depressed, dark bronze, subnitid; tarsi, palpi and antennæ brown.

Fig. 1.

Head and prothorax coarsely vermiculately punctate. Antennæ short (but thinner than in *S. vertebralis*), third joint little longer than fourth. *Prothorax* differs from that of *S. vertebralis* in the following particulars—sides notched, deeply in the female, less deeply in male, anterior angles strongly produced forward, sides more widely rounded and angulately incurved at base (where the dentation ends). Disc more coarsely punctate, the longitudinal lines more prominent, and having two larger depressions on basal half. *Elytra* more parallel than in *S. vertebralis*, with shoulders sharply margined, the raised intervals wider, less elevated, shining, and more evenly divided into elongate nodules. Suture flat throughout, and the seriate punc-

tures are much larger than in the preceding species. Abdomen dark bronze. *Dimensions*—10·5 × 4·7 mm.

Hab.—Grose Valley, Blue Mountains (taken by the author).

While having a similar general facies to *S. vertebralis* mihi, the form is shorter, squarer, and more parallel, the colour much darker, especially on the abdomen, while the widely different shape of the prothorax, its dentate edge, and coarser sculpture distinguish it. The female specimen is lighter in colour, with more dilated tarsi, and more dentate edge of prothorax than the male.

Seirotrana denticollis, n.sp. (Text fig.2).

Reddish-brown, opaque, flat, elongate and parallel, legs and antennæ lighter.

Head rugosely punctate, epistoma with a triangular split in the middle, front with a raised line of shining nodules forming a horse-shoe impression, having its arms pointing forward. Eyes large and nearly round when viewed from above. *Prothorax* longer than broad, strongly emarginate in front and base. Anterior angles roundly acute and a little recurved, narrower at base than in front and scarcely coarctate. Sides and front with broad red margin, this much narrower at base. Sides strongly dentate, widest part forming largest tooth at middle; gradually narrowing towards base; posterior angles rectangular. Disc thickly covered with raised shining nodules, and two wide depressions near posterior angles. *Elytra* wider than prothorax at base, and more than twice as long. Shoulders round and subrectangular. Sides parallel to apical third, then strongly vertically undulate. Disc with four rows of elongate shining nodules, alternating with five irregularly duplicated rows of minute and more depressed nodules. Surface undulate, especially towards apex. Epipleuræ wide and thickly granulated. Body beneath thinly clothed with brown decumbent hair. Femora with broad yellow ring near apex. *Dimensions*—11 × 4·2 mm.

Fig.2.

Hab.—Perth, W.A.

I have received a single specimen of the above from Mr. W. L. Du Boulay. While closely allied to *S. crenicollis* Pasc., and therefore totally unlike all other known species, it differs from that species in (1) the strongly dentate edges of prothorax; (2) the curiously undulate surface of the elytra; and (3) the much less regular pustulation of the elytral disc. My specimen is distinctly smaller than each of three specimens of *S. crenicollis* before me, whose average is 13 × 5 mm.

SEIROTRANA UNIFORMIS, n.sp.

Elongate-ovate, convex, black, nitid, antennæ, palpi and tarsi piceous.

Head coarsely punctate; antennæ stout, four apical joints continuously increasing in size, apical joint much the largest and oval. *Prothorax* convex, a little wider than long, front and base subtruncate; anterior angles very moderately advanced and nearly rectangular; base somewhat bilateral from the advance of the central portion of the elytra; posterior angles rectangular. Sides evenly and moderately rounded, sinuous towards posterior angles; recurved border at sides thick, narrower at apex, obsolete at base. Disc finely punctate, with larger punctures irregularly scattered on surface, but more frequent near base. Larger fovea at middle of sides near border. Central canal obsolete or scarcely indicated near base. *Scutellum* widely transverse, apparently smooth. *Elytra* elongate, subparallel, about twice and one-half as long and same width as prothorax, to which it is closely applied. Punctate-striate, with eleven striæ on each elytron; punctures in striæ large, regular and close. Intervals smooth and convex, especially towards sides and apex. Epipleuræ coarsely punctate. Abdomen longitudinally strigose, black and shining. All tibiæ bowed. *Dimensions*—14 × 5 mm.

Hab.—Quirindi, N.S.W. (Mr. J. K. Hay).

Two specimens of the above, labelled Quirindi, N.S.W., were amongst some Coleoptera received from the late Dr. C. D. Clark. While in general shape and colour it approaches *S. simplex*

Blackb., its elytral sculpture is widely different, the intervals being uniform and convex, with a slight tendency to waviness; while the punctures are much larger and closer than in that species. This is the only Seirotrana known to me, except *S. strigipennis* Bates, having no indication of nodulose elytra. The above diagnosis sufficiently differentiates it from *S. strigipennis*.

Hyocis bicolor (n.sp. *Trachyscelinarum*).

Head, prothorax, and underside dark ferruginous, elytra pale yellow with black markings, antennæ and legs pale rufous.

Head and prothorax closely punctate; antennæ shorter than in *H. Bakewellii* Pasc., with the last joint a lighter colour than the rest. *Prothorax* transverse, very similar to that of *H. Bakewellii* but less sinuate at the sides near base, and with posterior angles rectangular; disc closely clothed with whitish hair; median line distinct. *Scutellum* triangular. *Elytra* adorned at the middle of the disc with a large O-shaped black mark (this marking sometimes a little incomplete), obscure and irregular black markings near base: striate-punctate, the punctures closer and smaller than in *H. Bakewellii*, each puncture bearing a short yellow hair. Intervals convex. Fore tibiæ strongly dilated and bowed, other tibiæ straight. Under surface punctate and thinly pilose. *Dimensions* —2·5-3 mm. long

Hab.—Botany Bay, near Sydney, N.S.W.

I have five specimens of this very distinct insect, taken by myself on the sandhills at La Perouse, Botany Bay. I have compared it carefully with Macleay's species, *H. pallida* and *H. pubescens;* also with identified specimens of *H. Bakewellii* Pasc., *H. subparallela* Champ., and *H. occidentalis* Blackb. Mr. Blackburn has also kindly compared it with his other two species, *H. nigra* and *H. variegata*. From all of the above it is readily differentiated by colour alone; while the widely dilated fore tibiæ further distinguish it from any other Hyocis known to me.

ADELODEMUS EXCISICOLLIS, n.sp.

Oblong-oval, opaque brown, covered above and below with a thick squamose derm.

Head: labrum emarginate, punctate, with apex concave and fringed with brown hair; epistomal ridge clearly separated from front by a transverse depression, front subbilobed and depressed, with a longitudinal raised line in middle; eyes narrower than in *A. squalidus* Macl.; antennæ short and stout (not reaching beyond apical half of prothorax when set back); first joint thick, second very small and bead-like, third joint longest but not so long as fourth and fifth combined, joints 4-10 equal, eleventh longer than tenth and ovoid. *Prothorax* (4 × 5·5 mm.) widest behind middle, as wide at base as at apex, slightly convex on disc, with broad recurved foliate margins, deeply excised near hind angles (quasi-bilobed), anterior margin bisinuate, produced in middle in two raised humps (one on each side of the wide central channel), anterior angles prominent and acute; sides subangulately widened to beyond half-way, then suddenly excised rectangularly to nearly the full width of the lateral foliation, the posterior lobe forming a wide subrectangular posterior angle, this also recurved; base bisinuate and divided by the wide sutural channel. Disc and head alike covered with rugose punctures, more or less obscured by the squamose clothing. *Elytra* broader than prothorax at base, but the maximum width of each approximately equal; oval, convex, shoulders narrowly rounded, apex more acuminate and with steeper declivity than *A. squamosus*. Striate-punctate, both striæ and punctures somewhat obscured by derm, the intervals strongly pustulose and punctate, especially towards sides. Sternum foveate-punctate. Legs and abdomen squamose, femora hairy. Tarsi and tibiæ very much as in *A. squamosus*. *Dimensions*—15 × 6 mm.

Hab.—Victoria (received from Mr. C. French, F.L.S., Government Entomologist of Victoria); Gippsland (one specimen taken by Mr. H. M. Giles).

This interesting addition to the Australian Tenebrionidæ is a close ally of *A. squamosus* Macl., in its general structure, oral

organs, antennæ, legs and tarsi. It is easily distinguished by its remarkable prothorax, the anterior lobe of the lateral foliation being shaped like an elephant's ear. The wide and pronounced median line of the pronotum, on each side of which the antero-median lobe forms two rounded humps, is also remarkable. The derm which clothes the whole insect is readily removable, showing an opaque black surface beneath.

Ceropria bifasciata, n.sp.

Ovate, convex, nitid. Head and prothorax blue-black, with violet reflections; elytra the same colour, with yellow fasciæ as below; antennæ and legs brown; abdomen and under side of legs red.

Head: front and epistoma finely punctate, head narrower and more narrowly rounded than in *C. peregrina* Pasc. *Prothorax* more than twice as broad as long, truncate in front, sinuate behind, with two pronounced foveæ near basal border; anterior angles obsolete, posterior angles obtuse, wider at base than at apex; sides gently rounded. Disc minutely punctate. *Elytra* convex, striate-punctate with rows of closely placed punctures, these finer than in *C. peregrina*. Intervals flat, except near sides, the border sharply defined. Scutellar region, suture and ground colour metallic black with violet reflections, with two fasciæ yellow interrupted at suture, first at base wide and regular extending from border to near suture, second on apical third part of disc narrower, extending from border to half-way across each elytron, where it is curved towards apex. *Dimensions*—$9 \times 4{\cdot}5$ mm.

Hab.—Cairns, N.Q.

In form very like *C. peregrina* Pasc., its sculpture more resembling that of *C. valga* Pasc., from both of which it is easily distinguished by its yellow fasciæ.

Platydema metallicum, n.sp.

Oval, moderately convex, dark blue (sometimes violet), shining, body beneath, antennæ, legs, and palpi rufo-castaneous.

Head finely punctate, with transverse impression clearly separating front from episterna, without any erect horn to distinguish the sexes. *Prothorax* transverse, moderately convex, twice as broad as long, slightly narrower at apex than at base; anterior and posterior angles acute, sides very little rounded; base strongly bisinuate and closely fitting elytra, with median lobe slightly produced backwards; distinctly and closely punctate. *Scutellum* bronzy and triangular. *Elytra* a little wider and more convex than prothorax, elongate-elliptic, with greatest width behind middle; about once and one-half as long as wide; disc strongly striate-punctate, with intervals rather flat and very minutely punctate. Metasternum smooth and shining, abdomen with the four apical segments longitudinally strigose at their junctions; intercoxal process acutely rounded. *Dimensions*—Length 4 mm.; width 2(vix)mm.

Hab.—Sydney (found commonly in old fences by the author).

I cannot find that the above common insect has yet been described. It differs from all its Australian congeners, except *P. novicum* Motsch., in its metallic blue colour; whilst *P. novicum* is described as being twice the size of *P. metallicum*, and having its head and pronotum black. With nine specimens before me, I am unable to distinguish any sexual differences.

Heterocheira nitida, n.sp.

Black, very shiny, body beneath piceous-red, legs, antennæ and palpi rufo-castaneous.

Head and *prothorax* almost smooth and very nitid, the latter much wider at base than at apex. *Elytra* striate-punctate, the striæ very distinct on disc, less clear towards the sides; punctures in striæ regular and well defined. Pro- and metasternum smooth and shining, abdominal segments faintly longitudinally strigose; legs smooth and shining. *Dimensions*—6 × 2·8 mm.

Hab.—Cairns, N.Q. (sent by Mr. Anderson; also taken by Mr. H. Hacker).

I have three specimens, probably correctly identified by Mr. Blackburn, of *H. australis* Boisd., which are superficially like the

above; on closer examination, the following comparison of characters will readily differentiate *H. nitida* :—

H. australis.—Colour brown, moderately nitid. Sides of prothorax subparallel till near front angle. Pronotum finely but evidently punctured. Elytral intervals punctate. Punctures in striæ indistinct. Pro- and metasternum strongly punctate. Abdomen rugose. Legs and abdomen concolorous, piceous. Under surface of legs punctate. Dimensions—8 × 3 mm.

H. nitida.—Colour black, very nitid. Sides of prothorax rounded and narrowed anteriorly. Pronotum scarcely punctate. Intervals smooth. Punctures in striæ strongly marked. Pro- and metasternum smooth. Abdomen faintly strigose. Legs a much lighter colour than the abdomen. Under surface of legs smooth. Dimensions—6 × 2·8 mm.

The wide difference of locality is also to be noted, West Australia being stated in Masters' Catalogue as the habitat of *H. australis* Boisd. (My own specimens have no locality-label).

Pterohelæus nitiduloides, n.sp.

Broadly ovate, depressed, reddish-brown; legs, flanks, and suture near scutellum red.

Head with narrow, square, truncate clypeus, divided from the front by a raised tuberculate impression; behind this the front hollowed in centre and strongly punctate. Antennæ short (at rest extending to one-half length of prothorax) with the apical joints strongly clavate, apical joint globular and hairy. *Prothorax* very transverse, almost semicircular anteriorly, subtruncate posteriorly, with narrowly reflected border becoming obsolete near hind angles; anterior and posterior angles obtuse, much wider at base than at apex, sides gradually and evenly rounded, but suddenly incurved near base. Disc without central canal, and covered with short, decumbent, reddish pile, beneath which are obscure rugose punctures. Scutellum widely elliptic. *Elytra* narrower than prothorax, sides nearly parallel; bluntly rounded at apex, with very narrow border obsolete at apex. Disc covered (but far more sparsely than pronotum) with fine recumbent red

hair; finely costate, with about six faintly perceptible costæ becoming obsolete near sides. Intervals finely rugulosely punctate. Epipleuræ narrow. Abdomen densely punctate and pubescent. *Dimensions*—4·5-6 × 2·5-3 mm.

Hab.—Medlow, Blue Mountains, N.S.W.(taken by the author).

I captured a considerable number of this small Pterohelæus in September, 1907, on the underside of a dead tree, in the crevices of which they were so well concealed by their colouring as to be difficult to detect. Its nearest ally in colour and facies is *P. thymeloides* Pasc., from South Australia, which is, however, a much larger and more convex insect (among other differences). The only other Pterohelæus known to me of such minute dimensions is *P. opatroides* Macl., which is black in colour, longer and narrower than the above, with a widely different sculpture. The strongly clubbed antennæ in conjunction with its small size should enable this species to be easily identified.

CHARTOPTERYX IMPERIALIS, n.sp. (Subfamily *Cyphaleinæ*).

Elliptical-elongate, glabrous, subnitid, chocolate-brown above, darker beneath, tibiæ and basal joints of antennæ red.

Head: labrum emarginate, hairy, truncate in front, widely rounded on sides; epistoma prominent, raised and punctate, sinuate in front, meeting the square antennal orbit at right angles. Eyes very large, coarsely faceted and separated by about one-half width of one eye. Front more finely punctate than epistoma. Antennæ long, extending beyond base of prothorax, first joint stout, second thinner and very short, third as long as fourth and fifth combined. Joints 4-7 of equal length; 8, 9, 10 shorter and thicker; 11 about as long as 9 and 10 together. Joints 1-7 red and smooth, 8-11 brown and hairy. *Prothorax* almost flat, 6 × 10·5 mm., the length (excluding front angles) being measured at middle, the width at base. Width at apex 6 mm. Truncate in front, except for prominent and wide front angles, these acute, slightly reflexed, and extending the full length of the eyes. Sides very gently rounded, and slightly produced backwards at posterior angles, the latter acute. Base

strongly bisinuate. The whole pronotum margined by a raised shining border, thickest near anterior angles, thinnest at base. Disc slightly raised in middle, depressed towards sides, glabrous, but under a lens seen to be closely and finely punctate. At posterior angles are small subfoveate depressions. *Scutellum* large, forming an equilateral triangle with sides a little curved; minutely punctate. *Elytra* 25 × 16 mm. Oval and very convex. At base the same width as prothorax, soon widening in a regular curve to the greatest width behind middle, near apex rather suddenly and sinuately incurved, each elytron separately rounded at apex. This subapical sinuation emphasised by the raised shining border being discontinuous, the border from the shoulder backwards ending abruptly at three-quarters the length, a second more prominently raised border beginning *inside this*, and continued to apex. Disc very convex, with the greatest height in front of middle, gradually curved to apex. Glabrous, closely, finely, punctate, except sutural region and two smooth longitudinal lines on each elytron. *Abdomen* and whole underside smooth and very minutely punctate, the punctures becoming more evident (but requiring a strong lens to be seen) towards apex. *Legs*: femora and tibiæ smooth, the latter straight, very little thickened at apex, with small spine on inside.* Posterior tarsi with basal joint not as long as the rest combined. *Dimensions*—34-35 × 16 mm.

Hab.—Kuranda, N.Q. (Messrs. C. Dodd and H. Brown).

I have two specimens, the female from Mr. Dodd, the male from Mr. P. Shaw, who received it from Mr. H. Brown. I have seen one other specimen in the collection of Mr. C. French. It is by far the largest species of the group, but I have little doubt in placing it in this genus. The male has the prothorax slightly more widely rounded, the fore tarsi more transverse, the elytra more convex, and the abdomen thicker.

---

* Pascoe in his tabulation of Cyphaleinæ (Ann. Mag. Nat. Hist. April 1869, p.288) gives "basal joint of posterior tarsi as long as the rest together;" but in *C. childreni* Westw., and *C. victoriensis* Blackb., the proportions are much as in the above species.

MELAPS, n.gen. (Subfamily *Apocryphinæ*?).

Head triangular, inserted in prothorax as far as the eyes, antennal ridge small. Eyes prominent, round, entire. Antennæ scarcely covered at point of insertion; long, filiform and scarcely thickened towards apex; scape cylindrical, second joint obconic, third about twice as long as the scape, 4-10 about the same length and thickness, eleventh lineate-ovate, but not perceptibly thicker than preceding. Mentum subquadrate, membranous, maxillæ short, maxillary palpi very long with last joint securiform. *Prothorax* very convex and spherical; base and apex truncate, more than one-third as broad again as long, regularly rounded at sides; not margined. Base angles obtuse but marked, base closely fitting elytra. *Elytra* short, ovate, epipleuræ narrow and vertical, with the flanks of elytra raised above them. Shoulders close to but not meeting base angles of elytra, declivous; apterous, *Legs* stout, femora thickened, tibiæ slightly bowed at base and expanded at apex. Anterior tarsi with claw-joint longest, posterior tarsi with first joint as long as second and third combined; tarsi pubescent. Anterior coxæ globular, moderately separated; middle and posterior coxæ more widely separated, without trochantin. Metasternum shorter than mesosternum. *Abdomen* with penultimate segment narrower than the rest.

MELAPS CISTELOIDES, n.sp. (Text fig.3).

Very convex, ovate, black, shining.

Head subtriangular, finely but distinctly punctate, and sparingly pilose, hairs castaneous. Mentum, palpi, tibiæ and tarsi reddish. Palpi very long. Antennæ with joints 1-10 reddish, 11-13 black; not perceptibly thickened towards apex, joints long and narrow as above. Much longer than head and thorax combined. *Pronotum* very convex and spherical, base and apex truncate; width is to length as 25 : 18; greatest width at middle. Anterior angles obsolete, or so declivous as to be obscured by the convexity. Sides regularly rounded, posterior angles obtuse. Disc finely but distinctly punctate, punctures regular and distant; two round

depressions symetrically placed on each side of the middle, with no trace of medial canal. *Scutellum* transversely elliptical. *Elytra* convex, oval, glabrous, closely joining pronotum at base, but shoulders declivous and not meeting hind angles of pronotum. Sides gradually widening in a curve to half-way, then narrowing to a sharp point at apex; punctured similarly to pronotum, but the punctures coarser, producing short castaneous hairs. Body beneath and legs a piceous-red, shining. Femora swollen; tibiæ slightly expanded at apex and armed with a small spur; tarsi scantily and shortly pubescent. *Dimensions*—8 × 3·1 mm.

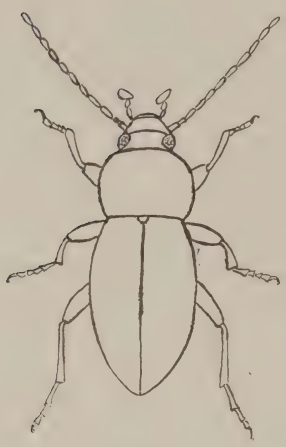


Fig.3.

Hab.—Mount Kosciusko (under logs; two specimens collected by the author).

This insect is entirely different from any Australian Tenebrionid I have yet met with. It is remarkable for the entire absence of striæ or costæ, combined with its convex form, and cistelid-like facies of legs and underside. It is most like *Melytra ovata* Pasc., in some respects, but differs widely from this insect in the shape of the prothorax and the structure of its antennæ. I have placed it provisionally in this section of the Tenebrionidæ with some diffidence.

Hymæa laticollis.

Elongate, subcylindrical; shining fulvous-brown, darker on front and pronotum, oral regions, epistoma and antennæ reddish.

Head placed vertically, coarsely punctured, less triangular, proportionately shorter and with eyes less prominent than in *H. succinifera* Pasc.; antennæ more slender and lineate, with the three apical joints more bead-like, *i.e.*, less flattened and more

globose. *Prothorax* ovate-cylindrical (sometimes cylindrical when viewed from above, distinctly and angulately widened in the middle when viewed from the side), wider than head, apical portion elevated and forming a hood-shaped lobe, separated from the posterior portion by a semicircular depression with extremities near the anterior angles. Truncate in front and behind, with anterior lobe slightly produced so that the anterior margin appears excised near the angles. Posterior angles obtuse and minutely toothed. Disc more densely but less deeply punctured than *H. succinifera*, and without any superimposed tubercles; scutellum large, transverse, semi-elliptic and fulvous. *Elytra* distinctly longer than head and thorax together, not wider than prothorax, elongate-ovate, glabrous, basal half subparallel, very slightly widened before apex, shoulders rounded but distinct, sides with narrow horizontal yellow border. Epipleuræ narrow and oblique. Seriate-punctate, punctures in series large and close, the lines of punctures less regular than in *H. succinifera*, giving the raised nitid interstices a wavy appearance. On each elytron are amber-like tubercles less raised than in *H. succinifera* and placed as follows: two longitudinally oval spots on basal half (inner one nearer base), one smaller spot near apical declivity, a fourth much larger than this, on the shoulder. Undersurface, especially abdomen, coarsely punctate. Colour brown-black; legs dark amber-colour, five femora armed on inner ridge with blunt tooth; tarsi pilose. *Dimensions.*—5 × 1·5 mm.

Hab.—Sea Lake, Victoria.

This description has been made from a unique specimen sent by Mr. G. C. Goudie, who now possesses the type. It is a doubtful congener of *H. succinifera* Pasc., as the characters of the genus *Hymœa* (Ann. Mag. Nat. Hist. Jan. 1869) would have to be modified to include this insect, especially as to the shape of the head and its insertion in the thorax, shape of prothorax and body. The sculpture of the elytra, the structure of the antennæ, the oral organs and the abdomen are closely similar, so that, provisionally at least, it may be referred to this genus. The most striking difference lies in its hood-shaped prothorax, and in

its vertically placed head, almost resembling in this respect the genus *Bostrichus*.

BYALLIUS KOSCIUSKOANUS, n.sp.

Elongate-oval, moderately convex; black, subnitid, antennæ piceous-red; antennæ, labrum, and tarsi clothed with golden pile.

Head closely, coarsely punctate, labrum and rounded sides of mentum prominent, the former separated from the clypeus by a brown membrane. Clypeus truncate, without epistomal ridge, with front angles rectangular. Antennal orbits prominently raised and parabolically rounded in front of eyes. Antennæ with third joint at least as long as fourth and fifth combined; joints 4-7 obconic, 9 and 10 oval, 8 intermediate in shape between 7 and 9, 11 much longer than 10, oval; apical joints flatter, less nitid, and lighter in colour than basal. *Prothorax* very convex, wider than long (5 × 7 mm.), with greatest width near base, wider at base than at apex; sinuate in front, anterior angles prominent, acute and a little reflexed. Sides scarcely foliaceous, little rounded, with the thickened edge more upturned towards front than towards base, edge much thinner at base and apex; posterior angles widely obtuse, scarcely distinct and deflected. Disc finely punctured, sometimes with a transverse line near base forming a basal lobe. *Scutellum* widely transverse and triangular, punctured as on pronotum. *Elytra* ovate and strongly convex, wider than prothorax at base, about once and one-half longer than wide, gradually widening posteriorly, greatest width at apical third. Reticulately rugose, with three rows of wavy subcostate lines on each elytron; the whole distinctly but finely punctured, and margined by a thin subcrenulate border. Legs, abdomen, and sternum coarsely punctate. *Dimensions* 18-21 × $7\frac{3}{4}$-11 mm.

Hab.—Lower slopes of Mount Kosciusko, near Jindabyne, N.S.W. (taken by the author).

This insect differs from the only other member of the genus (*B. reticulatus* Pasc.) in the following particulars. Prothorax shorter, in proportion to length, much more convex, and with

sides much less strongly rounded and recurved. (N.B.—The figure of *B. reticulatus*, Ann. Mag. Nat. Hist. 1869, pl.x. fig.6, exaggerates the recurved sides). The elytra are less coarsely rugose, but the punctures above and below are larger and more distinct. The abdominal punctures especially differ; in *B. reticulatus* they are largely confluent and longitudinally rugose; in *B. kosciuskoanus* they are uniformly round and separate. My specimen of *B. reticulatus* Pasc., is from Fernhill, Victoria; and was compared with the type in the British Museum by myself. Two other specimens from Buffalo Mountains, Vic., differ from the Fernhill specimen in having a less widely reflected margin to prothorax, and more distinctly raised costæ on the elytra. Four specimens of *B. kosciuskoanus* are before me, of which I consider there are two of each sex. If this be correct, the apparent males are smaller, narrower, more convex than the females, with the penultimate joint of the front tarsi less transverse.

CARDIOTHORAX ROTUNDICOLLIS, n.sp.

Flat, elongate-ovate. Black, moderately nitid.

Head and front with typical markings. Antennæ short and stout, with apical joints less markedly thicker than the basal joints, as in most of its allies, and clothed with reddish hairs. *Prothorax* almost flat and widely foliate at sides, and with a markedly wide raised border extending all round except at base, and middle part of apex. Much narrower at base than apex, widest at middle; base slightly curved, with the concavity towards the elytra and basal edge depressed. The front very sinuate, with middle of disc advanced and anterior angles well produced forward to meet the rounded sides at an obtuse angle. Sides widely and regularly rounded, rather abruptly contracting at base posterior angles obtuse and subobsolete. Central channel deeply, impressed throughout, except on apical border. On each side of this two deeply lineate impressions abruptly ending forward but produced at right angles to meet central channel behind. Foliate sides divided from disc by curved impression. *Elytra* ovate, deeply and regularly striate. Intervals sharply raised, about as

wide as prothorax at widest. Shoulders prominent and rounded, with strongly raised border in that region, apex narrowly rounded. *Abdomen* black, shining, epipleuræ smooth, tibiæ straight and slender, legs unarmed. *Dimensions*—14 × 4·5 mm.

Hab.—Atherton, N.Q.

A single specimen, which I take to be ♀. The marked characters of the antennæ and prothorax of this species distinguish it from all others of the genus. It is in general outline like a small *C. Walckenærii*, from which it widely differs in all other characters. I am indebted to Mr. Sloane for this specimen which he captured himself near Atherton.*

CORIPERA BISTRIATA, n.sp. (Text fig.4).

Elongate-oval; dark bronze shining; tarsi, basal joints of palpi, knees, thoracic and elytral bands castaneous; antennæ fuscous.

Fig.4.

Head elongate, labrum salient and square, epicranium separated from clypeus by transverse ridge. Coarsely punctate. Eyes large, oval, coarsely faceted. Antennæ with the four penultimate joints triangular, apical joint spheroidal, these five joints opaque; joints 1-8 shining; 3 scarcely larger than 4, joints 1 and 2 short and beadlike. *Prothorax* irregularly and strongly rugose, transversely striolate on the sides, about as long as broad. Bisinuate and emarginate at apex, anterior angles bluntly acute; sides with undulating outline, slightly widest at middle. Hind angles sharp and subrectangular; this angle, though not dentate, emphasised by the depressed groove at base near angles. Base strongly sinuate and produced a little backwards at middle; base and apex intersected by the otherwise obsolete medial channel. Entire pronotum edged by a shining reflexed border. Sides, for the width of front and hind angles, with a light castaneous band. *Scutellum*

* A second specimen subsequently received from Cooktown, sent by Mr. Anderson of Cairns.—*Postscript*, 21st July, 1908.

small and transverse. *Elytra* a little wider than prothorax at base, humeral angles bluntly rectangular; sides parallel till near apex, then sharply narrowed to a point. A narrow, light, castaneous band running from shoulder to apex, widening at apex. A single narrow stria on each side of and close to suture, not reaching base. On each elytron about twenty-five ocellate foveæ; these not arranged in series, but scattered irregularly over the whole surface; foveæ, as well as the spaces between them, irregularly and finely punctate. The sides have a crenulate appearance, especially towards apex, due to raised "lumps" on the surface, which are continued to a modified extent on the epipleuræ. Near the scutellar region the sculpture presents an irregular strigose appearance. Underside dark bronze and smooth, except apical segment of abdomen, which is finely punctate. *Dimensions*—13 × 4·4 mm.

Hab.—Zeehan, Tas. (one specimen, kindly given to me by Mr. A. M. Lea).

A quite distinct member of this genus, easily recognised by its single stria on each elytron, and its irregular ocellate pattern, in combination with the light-coloured band.

Brycopia crenaticollis, n.sp. (Text fig.5).

Shortly ovate, convex; nitid, bronze, glabrous; antennæ, tibiæ, underside of femora castaneous; tarsi and palpi pale castaneous; abdomen dark metallic-bronze.

Head short, wide, densely punctate; eyes round and prominent. Antennæ stout, reaching (when set back) beyond base of pronotum; joints increasing in width from base to apex and closely articulate; joint 3 very little longer than 4, joint 11 much the largest and ovate. *Prothorax* convex, coarsely and regularly punctate, punctures closer than in *B. globulosa* Carter, and not tending to confluence as in *B. pilosella* Pasc.; truncate at base and apex, with apex slightly advanced in the middle, sides moderately rounded anteriorly, abruptly narrowed posteriorly, and minutely crenate at edge; anterior angles sharply obtuse, posterior angles obsolete. *Scutellum* small, transverse and

depressed below the plane of elytra. *Elytra* moderately convex, much wider than prothorax at base, shoulders squarely rounded, sides not bulging towards middle in either sex, and with rather blunt apex; striate-punctate, with ten striæ on each elytron, the last two on the sides; striæ fine, with punctures close and regular. Intervals flat, very minutely punctate, and wider near suture than at sides. Beneath densely punctate, punctures especially coarse on epipleuræ and prosternum, much finer on abdomen. Intermediate tibiæ slightly curved, the other tibiæ straight. *Dimensions*—♂, 4·5 × 2·2 mm.; ♀, 5·8 × 2·5 mm.

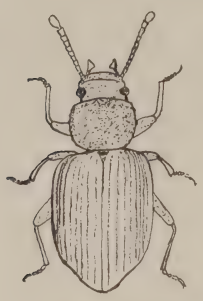


Fig.5.

Hab.—Grose Valley near Blackheath (four specimens found in rotten wood by the author).

This insect is easily distinguished from its allies by its short, rounded, and minutely but distinctly crenate sides of prothorax. It is nearest to *B. globulosa* mihi, which besides being more convex, has a much wider prothorax (in *B. globulosa* as wide as the elytra) with the punctures thereon less close and deep. The eyes are not so large as in *B. pilosella*, but are prominent, quite round when viewed from above, while the ocular cavity beneath is densely punctured. One specimen presented to the Macleay Museum, the three types in the author's collection.

BUPRESTIDÆ.

Cyria cincta, n.sp.

Elongate, depressed, black, shining, with a broad lateral vitta flavous on elytra and prothorax. Beneath shining black, with base and sides of abdominal segments and legs sparsely covered with long white hairs.

Head coarsely and unevenly punctate, with scattered whitish hairs, deeply channelled between the eyes. Antennæ fine (much finer than in *C. vittigera* Hope) and pilose. Third joint

longer than fourth, successive joints becoming thinner and shorter. *Prothorax*: width at base, 8 mm., at apex 6 mm.; length 6 mm. Apex strongly bisinuate and notched in the middle, the thick elevated border strongly raised in this region, being hollowed at the junction of the middle canal. Sides scarcely rounded, the yellow vitta not extending to apex. Base bilobed and acutely directed backwards at centre, posterior angles acute. Disc rather distantly punctate, punctures coarser and more crowded near apical angles, much finer near base at centre. Central channel marked by finely cut line throughout, widening at base and apex. *Elytra* 22 × 9 mm. Shoulders widely rounded, sides slightly incurved at middle, finely punctate-striate, the striæ fine and shallow, interstices flat; punctures in striæ small and circular, largest in the third and fourth striæ beyond base, becoming smaller by degrees towards apex, *there* very minute. Lateral vitta not extending to apex, occupying the width of three intervals (broader on shoulders), leaving, however, a narrow black border outside the vitta. Each elytron strongly bispinose at apex, inner spine formed by the termination of the sutural edges, these acutely divided at apex. Beneath, first abdominal segment with large scattered punctures; on each succeeding segment the punctures smaller and fewer. *Dimensions* —30 × 8 mm.

Hab.—Kuranda, N.Q. (taken by Mr. C. Dodd).

This fine insect, from the collection of Mr. C. French, adds a very distinct member to this small genus. It is readily distinguished by colour and its bispinose elytra, in which it most nearly approaches *C. vittigera* Hope; while in form and sculpture it is nearer *C. australis* Boisd. Type returned to Mr. C. French.

CYRIA AUSTRALIS Boisd. (*C. gagates* Hope).

Notwithstanding Saunders' note* I am convinced that the above species is quite distinct from *C. imperialis* Don. While it is probable that "melanism" may occur in the case of *C. imperialis*

* Trans. Ent. Soc. Lond. 1868, p.3.

—Boisduval specially mentions one case ('Faune de l'Océanie' p.61)—such cases are extremely rare; and some remaining mark, usually the thoracic vitta, remains to mark the species. *C. australis*, however, is a common form, with a definite habitat (South Queensland), constant in colour and form. I have examined a considerable number of both species, and note the following distinguishing characteristics:—

C. australis Boisd.—*Antennæ* finer, third joint longer than fourth. *Head*: frontal punctures fewer and more irregular. *Prothorax* without lateral yellow band; disc with four (or more) large foveate depressions; median part of disc lightly and distantly punctate, punctures small. *Elytra* of wider form, with a tendency to swollen middle; more convex; punctures in striæ small; basal part of elytra transversely strigose, especially towards sides; apex acutely angulate; sutural part longest. *Prosternum* distantly punctate. *Metasternum* faintly punctate.

C. imperialis Don.—*Antennæ* stouter, third joint about equal to fourth. *Head*: frontal punctures dense and regular. *Prothorax* with yellow band; disc in general with no regularly placed large foveæ; median part of disc much more coarsely and densely punctate, punctures large. *Elytra* of narrower and more tapering form; less convex; punctures in striæ larger; basal part without any transverse strigosity; apex rounded. *Prosternum* strongly and coarsely punctate. *Metasternum* coarsely punctate.

A specimen of *C. imperialis* from Tasmania is less coarsely and less densely punctate than specimens from the mainland, but even this presents markedly different sculpture from that of any specimens of *C. australis* that I have examined.

Stigmodera caudata, n.sp.

Oblong, feebly enlarged at the posterior third. Head, antennæ, pronotum, prosternum, and ovate patch on elytral apex brilliant shining blue. Elytra otherwise yellow with margins red. Beneath, except prosternum and legs, brilliant metallic blue-green.

Head deeply punctate, widely channelled between eyes, colour darker on clypeus than on front. *Prothorax*: length 4 mm.; width at base 7 mm., at apex 4 mm. Anterior margin produced, anterior angles acute, sides widely rounded, posterior angle acute; base strongly sinuate, median lobe produced backwards and foveate near scutellum; junction of middle and lateral lobes marked by a triangular notch on basal border. Disc very convex, central region humped, thence strongly declivous anteriorly, less steeply declivous towards sides and base. Finely and regularly punctate; without central canal. *Scutellum* blue, cordate and depressed in centre. *Elytra* 17 × 8·5 mm., widest at posterior third, wider at base than prothorax, sides slightly sinuate, apex strongly bidentate, inner tooth spinose (formed by elongation of suture), slightly longer than exterior tooth and apparently elevated. (This appearance due to convexity of disc near apex). Suture divergent at apex. Disc striate-punctate, punctures in striæ large and close, intervals convex. Yellow, except for oval apical patch blue, and red margin, the former (blue patch) narrowed near apex, then suddenly widened to include the exterior tooth. Exterior four intervals near apex sanguineous, the red margin narrowing to a single interval on sides, but not quite continued to base. Beneath: sternum deeply and regularly punctate, first segment of abdomen moderately punctate, last segment closely but more finely punctate; other segments minutely punctate. *Dimensions*—21-22 × 8-8·5 mm.

Hab.—Cairns district, N.Q. (Mr. Henry Hacker).

I am indebted to Mr. Hacker for a pair of this as of the following fine species. I have been unable to find anything like either amongst the numerous species hitherto described, nor are they known in the British Museum, whose fine collection, recently enriched by the addition of Mr. Kerremans' collection, I have lately examined. The apparent elevation of the apical portion, due to the pre-apical convexity, combined with its colour, and strongly bidentate elytra will sufficiently differentiate it.

STIGMODERA UNIMACULATA, n.sp.

Oblong-oval, moderately widened at the posterior third. Head and pronotum blue-green; antennæ, legs, and underside bright metallic-green ; elytra yellow, with a large triangular macula near, or on apex, blue-black; apical region sanguineous at sides, basal margin narrowly violaceous.

Head densely punctate, not furrowed between eyes. *Prothorax* 4 mm. long; 6 mm. wide at base, 3·5 mm. wide at apex. Anterior margins produced with angles acute, anterior margin wide and raised. Sides sinuately widened, widest behind middle, with depression near widest point (in one specimen foveate), then slightly incurved, posterior angles subrectangular; base sinuate and lobed, middle lobe moderately produced backward. Central canal strongly marked throughout. Disc moderately convex, deeply and closely punctate. *Scutellum* dark blue, cordate, slightly elevated and smooth. *Elytra* 13 mm. × 7 mm., widest behind middle; same width as prothorax at base, then sinuately widening, and rather widely rounded at apex, without dentation; suture divergent at apex. Disc striate-punctate, punctures in striæ not in general clearly marked, but evident on basal half, becoming smaller and inconspicuous towards apex, where the striæ themselves become vague or obsolete. Intervals very slightly raised. The black macula in one specimen extends to the apex; in the other it does not reach apex; with exterior four to five intervals stained red, this colour not extending beyond posterior third. Beneath, closely and regularly punctate, the punctures becoming gradually finer towards apex of abdomen. Tibiæ and tarsi clothed with short yellow hair. *Dimensions*— 18-19 × 7-8 mm.

Hab.—Cairns district, N.Q. (Mr. Henry Hacker).

In general appearance like the preceding species, but on closer view widely different and easily separated from it by its shorter and proportionately wider form, its widely different sculpture, and its undentate elytral apex. The colour and shape of the apical maculæ differ, that in *S. unimaculata* having anterior edge straight (or bisinuate with concavities facing forward); in *S. caudata* it is oval, with anterior edge convex towards the front.

STIGMODERA FLAVO-PURPUREA, n.sp.

Oval, depressed, shining, rather widely enlarged towards the apical third. Head, antennæ, prothorax, legs and undersurface a bright metallic-green. Elytra bronze-purple variegated with yellow pattern as in *S. flavo-picta* Boisd., or (regarding the yellow as the groundcolour) the purple pattern is as follows—a wide sutural and basal margin, the latter extended to form a curved longitudinal vitta from the shoulder, meeting the side again before the basal half; a postmedian fascia widened at middle, and the apex widely covered, with the front margin of apical blotch bisinuate.

Head and *prothorax* strongly and closely punctate, the former canaliculate, the latter without any sign of a median line except a shallow fovea near base; widest at base, with sides rounded. *Scutellum* metallic green, cordate and depressed in middle. *Elytra* regularly striate-punctate, intervals rather strongly convex and finely punctate. Apex narrowly and ovally (longitudinally) excised and undentate. *Sternum* coarsely, *abdomen* very finely punctate, the whole rather thickly clothed with whitish decumbent hair. *Dimensions*—10-12 mm. long; 3·6-4·6 mm. wide.

Hab.—Medlow, Blue Mountains, and Jindabyne, N. S. W. (taken by the author).

This widely spread insect has, so far as I can discover, escaped notice. There is no specimen in the British Museum or in the Kerremans Collection. The pattern is almost an exact replica of *S. flavo-picta* Boisd., as figured by Saunders (Trans. Ent. Soc. Lond. 1868, Part 1, Pl.iii. fig.29), but it differs markedly from that species (which I have from Adelaide, Tasmania, and from New South Wales) in the following respects. In shape, flatter and wider, with more sinuately widened sides to the elytra. In colour, the prothorax and abdomen are of a much brighter metallic green, while the elytral colouring is even more emphatically distinct, the darker part being of a coppery-purple. (It is blue in *S. flavo-picta*). The sculpture and clothing of the abdomen of these two species differ in a marked degree. It is altogether a handsomer and more striking species.

S. DIMIDIATA, n.sp.

Oblong-oval, subparallel; very slightly widened at the posterior third. Head, prothorax, and greater part of elytra shining peacock-blue-green; elytra adorned with yellow as follows—one elongate spot on lateral edge near shoulders; an interrupted median fascia, extending from sides, terminating at second interval from suture and widest near middle, with its hind margin nearly straight, its thickened portion extending triangularly forward; and a subapical curved fascia interrupted at first elytral interval, meeting on the sides a narrow yellow border which begins at this point and is continued nearly to apex.

Head coarsely punctate, strongly canaliculate, antennæ with basal joints blue, the rest metallic brown. *Prothorax* moderately convex, widest at base, sides lightly rounded and a little explanate at base; coarsely punctate, punctures becoming confluent and rugose towards the sides; median line scarcely indicated in front and by a smooth space and small fovea at base. *Scutellum* triangular and minutely punctate. *Elytra* striate-punctate, with intervals rather flat except on sides and towards apex, and closely rugulosely punctate. Apex excised in a small semicircle, undentate. *Sternum* and *abdomen* a brilliant metallic green, the former sparsely and finely clothed with short whitish hairs, the latter smooth; the whole underneath strongly punctate. Femora metallic green, tibiæ blue, tarsi brown, clothed with golden hair. *Dimensions*—9-12 mm. long; 3-4 mm. wide.

Hab.—Blue Mountains (taken by the author).

This species, commonly found in the Kanimbla Valley, near Blackheath, in November, has not yet, I think, been described. In colour it is not far removed from *S. subgrata* Blackb., (*S. campestris* Kerr.), but it is without the yellow border to the pronotum of that species, while the groundcolour is of a far more brilliant iridescent blue-green, which varies in different specimens. In general the blue is more prominent on the elytra, with the greener tint on the pronotum, but it is impossible to give the limits of these colours. It is besides more elongate and parallel than *S. subgrata*, with the apex of the elytra clearly excised.

ON THE NEW GENUS *AUSTROGYNACANTHA* [NEUROPTERA: *Odonata*] WITH DESCRIPTION OF SPECIES.

By R. J. Tillyard, M.A., F.E.S.

(Plate v.)

In his unpublished MSS.* de Selys has described a new species *Gynacantha heterogena* from a unique female in his collection. This interesting species has ever since remained known to odonatologists by this unique example only. Two years ago M. René Martin sent me the description and locality—Rockhampton, Queensland—and I was hopeful that I might be fortunate enough to discover the male. While examining and naming the fairly extensive collection of Odonata in the Macleay Museum, Sydney University—most of which are Queensland insects taken by Sir William Macleay's collectors—I found two males of a species which evidently coincided with *G. heterogena*. One of these was presented to me in exchange by Mr. Masters, the Curator of the Museum; and as it is from Rockhampton, the same locality as the unique female of de Selys, I have founded my description on it and made it the type-male. This year, during my visit to Cooktown, I searched carefully for it and for other species of *Gynacantha*, but the continuous heavy rains

* The species is not recorded in the Zoological Record, which I have carefully searched through twice from 1866 to present date. It is not recorded in Kirby's 'Catalogue of the Odonata,' but it is given by M. René Martin, without description, in his 'Odonates du Continent Australien 1902.' I have therefore concluded that the description was known to M. Martin but not to the world, and is probably one of de Selys' numerous unpublished MSS. species.

made it impossible to obtain any *Aeschnidæ* worth mentioning. A week after I left, however, my friend Mr. Olive found this species by no means uncommon there, and he has since then forwarded me six males and six females. These, in spite of considerable damage in transit by post, afford me sufficient material for the present paper. Doubtless de Selys felt, when describing the female, that its smaller size and very different markings and colouration might warrant the formation of a new genus to contain it; at least the name *heterogena* irresistibly suggests the impression it made upon his mind. But it was not de Selys' way to propose a new genus for a unique female, which possessed all the more essential characters of the genus *Gynacantha* as defined by Rambur. Later on Förster,* in instituting the new genus *Karschia* for the reception of his species *Gynacantha cornuta* and *G. angulata*, *of which the females alone were known*, seems to have set a precedent which it would not be wise to follow. It is at least evident that the characteristics of his genus are incomplete, and must necessarily suffer alterations and additions when the males of his species are discovered. It is also evident that when he speculates as to the probable number of cells in the anal triangle of the hindwing of the *unknown* male, he is not dealing with facts at all, and such speculations should be rigidly kept out of his generic definition. With the male of *G. heterogena* before me, I can go so far as to say that no odonatologist could possibly have predicted the extraordinary form of its anal angle, either by examination of the corresponding cells of the female, or by drawing on his imagination. Even with the added knowledge of the group that this remarkable insect has given me, I am not at all prepared to say what the males of *Karschia cornuta* and *angulata* will be like. They might possess either a two-, three-, or four-celled anal triangle, and it may be either sharply angulated, as in the true species of *Gynacantha*, or of the peculiar rounded form found in

* Odonaten aus Neu-Guinea, von F. Förster in Bretten, ii.; Természetrajzi Füzetek, xxiii. Köt. 1900 ("Bemerkungen zur Gattung *Gynacantha* Ramb.").

G. heterogena. Though the two species of *Karschia* are of smaller size than the true species of *Gynacantha*, yet *G. heterogena* again is smaller still. And though *Karschia* exhibits several important differences from the true species of *Gynacantha*, yet *G. heterogena* (female) again exhibits important differences from *Karschia*. Hence I will not attempt to rope in the females of *Karschia* with *heterogena*, whilst, on the other hand, it is impossible to ignore the striking characters of the male of *heterogena* and attempt to place it, by female characters only, under the genus *Karschia*.

I propose to found a new genus *Austrogynacantha* for the reception of the beautiful and remarkable species *Gynacantha heterogena*.

AUSTROGYNACANTHA, n.g.

Type *Gynacantha heterogena*.

Characters as in *Gynacantha* Rambur, viz., "Face narrow, eyes large, touching for a long space, slightly sinuous behind, occiput very small. Second segment of abdomen in male having a pronounced tubercle. Appendages of male simple, slender; last segment in female jutting out and prolonged below, furnished with long spines [two or three only in the species which I know]; membranule nearly nil,"* but with the following important exceptions and differences, shown best by a comparative enumeration.

GYNACANTHA (s.str.)[*G. Rosenberghi*† Selys].—(1) Large insects, expanse of wings in ♂ 90 mm. at least. (2) *Abdomen of both sexes sharply constricted at segment* 3. (3) Spurs of segment 2 in ♂ very conspicuous, *rounded*. (4) Hindwings very broad. (5) *Anal margin of hindwing of* ♂ *strongly angulated*; the outer side of the anal triangle composed of a very strong and thick vein, much stouter than the continuation of the postcostal margin; anal angle *conspicuously angulated*. (6) *Anal triangle of hind-*

* Rambur, Neuroptères, p.209, 1842.

† I have chosen this species as being one that is both well known to me and very typical of the genus.

wing of ♂ rather short, broad, three-celled. (7) Triangles of fore- and hind-wings of equal length, 6-7 celled, and practically similar. (8) Nodal sector, just below the pterostigma, takes an abrupt and conspicuous bend, and then runs straight to the margin of the wing. (9) Arculus at least 2 mm. from the inner angle of the triangle; *at least one* hypertrigonal cross-vein interposing.

Austrogynacantha [*G. heterogena*]. — (1) Size moderate, expanse of wings in ♂ about 80 mm. (2) *Abdomen of both sexes not constricted at segment 3.* (3) Spurs of segment 2 smaller, not very conspicuous, *angulated.* (4) Hindwings only moderately broad. (5) *Anal margin of hindwing of ♂ scarcely angulated at all;* the outer side of the anal triangle scarcely, if at all, thicker than the rest of the postcostal margin, and *curving insensibly round to join it at the anal "angle."* (6) *Anal triangle long and narrow, four-celled.* (7) Triangle of hindwing somewhat shorter and broader than that of the forewing, both four-celled. (8) Nodal sector takes only a slight and gentle curve. (9) Arculus scarcely 1 mm. from inner angle of triangle; *no* hypertrigonal cross-vein interposing.

The following may be indicated as less important, or subordinate, differences :—

Gynacantha (s.str.).—(10) Space between the fork of the subnodal sector and the supporting sector beneath it 5 or more cells broad. (11) 4-6 hypertrigonals in hindwing. (12) Between the short sector and the auxiliary sector lying below it, at its broadest point, 4-5 cells. (13) Superior appendages of ♂ very long (about 7 mm.), slender, narrow, and leaf-like. (14) Appendages of ♀ very long and exceedingly fragile. (15) Pterostigma 3·5-4 mm.

Austrogynacantha.—(10) Space between the fork of the subnodal sector and the supporting sector beneath it 3 cells broad. (11) 2-3 hypertrigonals in hindwing. (12) Between the short sector and the auxiliary sector lying below it, at its broadest point, 3-4 cells. (13) Superior appendages of ♂ strong and fairly thick, not so long (5 mm.), narrow, sublanceolate. (14) Appendages of ♀ not so long, similar in form, and fragile. (15) Pterostigma 3 mm.

Of these differences, I consider Nos. 2, 5, and 6 of primary importance, and sufficient in themselves to place *Austrogynacantha* absolutely apart from *Gynacantha* (s.str.). The form of the abdomen may be seen in the Plate (fig.1); the remarkable formation of the anal triangle of the male, giving it practically a *rounded* hindwing, in fig.7; while that of *G. Rosenberghi* is shown in fig.6. The difference in the curvature of the nodal sector may be studied in figs.8 and 9.

The differences 10-12 may be directly attributed to the difference in size between the insects; while differences in the appendages and pterostigma cannot be pressed, for we find an amazing amount of variation in these respects in the *Aeschnidæ*. For instance, the species of the genus *Austroaeschna* show remarkable variety in the size and shape of the appendages of both sexes; while actually in the *individual* specimens of *A. unicornis* Selys, the pterostigma shows a considerable variation in length.

It is now necessary to indicate the differences between *Karschia* Förster, and *Austrogynacantha* Tillyard. This can only be done by a comparison of the females, the males of *Karschia* being still unknown. Furthermore, the position of *Karschia* in any classification of the *Aeschnidæ*, as well as its exact relation to *Gynacantha* (s.str.) cannot be accurately determined until the males are forthcoming.

Karschia Förster (*K. cornuta*♀ Foërster).—(1) Upper edge of front interrupted in the middle, more or less projecting in an angle. (2) Eyes strongly arched above, not depressed. (3) Spikes of the terminal fork of the tongue-shaped abdominal appendage on seg. 10 only half as long as the tongue. (4) Between nodal and principal sectors, near end of wing, only 5 rows of cells at the most. (5) 3-4 hypertrigonals in hindwing.

Austrogynacantha Tillyard (*G. heterogena* ♀).—(1) Upper edge of front *not* interrupted in the middle, straight or very slightly curved as in *Gynacantha* (s.str.). (2) Eyes weakly arched above, as in *Gynacantha* (s.str.). (3) Spikes of the terminal fork of the tongue-shaped abdominal appendage on seg. 10 almost as

ong as the tongue (Plate v. figs.4, 5). (4) 6-7 rows of very small cells. (5) 2-3 hypertrigonals in hindwing.

Karschia and *Austrogynacantha* apparently agree in the shape of the abdomen at segment 3, and also in the curvature of the nodal sector under the pterostigma.

Austrogynacantha and *Gynacantha* (s.str.) agree in the shape of the front and eyes, and practically also in the form of the membranule, which, though small in both, can scarcely merit the summary dismissal implied in the "presque nil" of Rambur (Plate v. figs.6, 7).

The following key will now serve to distinguish the new genus and to show its correct position in a classification of the Australian genera of the subfamily *Aeschninæ*.

1	Hindwing of ♂ *without* an anal triangle (*i.e.*, postcostal margin *quite rounded*)	*1.*
	Hindwing of ♂ *with* an anal triangle (*i.e.*, postcostal margin *more or less angulated*)	*2.*
1	Inferior appendage of ♂ truncated	*Anax.*
	,, ,, ,, triangular	*Hemianax.*
2	Subcostal vein prolonged beyond nodus	*Telephlebia.*
	,, ,, *not* prolonged beyond nodus	*3.*
3	Basilar space reticulated	*Caliaeschna.*
	,, ,, free	*4.*
4	Subnodal sector *not* bifurcated	(absent from Australia)
	,, ,, bifurcated	*5.*
5	One row of cellules under fork	*Austroaeschna.*
	3-7 rows ,, ,, ,,	*6.*
6	Seg.10 of ♀ rounded below, carrying small spines	*Aeschna.*
	,, ,, prolonged below into a tongue armed with two distinct prongs	*7.*
7	Anal triangle of ♂ *fairly broad, 3-celled;* postcostal margin *strongly angulated*	*Gynacantha.*
	Anal triangle of ♂ *very narrow and long, 4-celled;* postcostal margin scarcely angulated at all	*Austrogynacantha.*

AUSTROGYNACANTHA HETEROGENA.

Gynacantha heterogena Selys MSS. (♀).

♂. Total length 59-60 mm.; abdomen 46 mm.; fore and hindwings 37-38 mm. Wings: *costa* brown, *subcosta* and *nodus*

pale brown, rest of neuration dark brown to black; *pterostigma* 3 mm., dark brown; *membranule*, fore very small, white; hind 1·5 mm., very narrow, white. *Nodal Indicator* ‖15-18 10-13‖ Head: *eyes* dark brown, very contiguous; ‖11-14 10-13‖. *occipital triangle* very small, yellow; *vertex* very small, forming a yellow crescent-shaped tubercle. *Front* hairy, dull yellowish-brown above, upper edge marked with an indistinct dark brown ray gradually merging into the ground-colour; *face* olive-green, yellowish on sides; *clypeus* hairy, greenish-yellow; *labrum* dull greenish-yellow, an indistinct narrow brown line in suture next clypeus; *labium* and *genæ* dull yellowish, mouth edged with dark brown. Thorax: *prothorax* very small, brown. *Meso-* and *metathorax* rather short and thick, dark chocolate-brown above, dorsal ridge yellow, elevated near its centre into a sharp spine; on either side a beautiful slanting lemon-yellow antehumeral ray, rather short, and tapering to a point outwards in front. Sides of thorax greenish-yellow, more or less shaded with brownish-olive. Wing-joins and notum pale brown, profusely spotted with yellow. *Legs* very dark brown, underside of profemora pale yellowish, tibiæ distinctly ciliated. Abdomen: 1 wide, 2 slightly narrowing, 3 *not* constricted, 3-10 almost cylindrical, if anything 7-9 slightly wider than the rest, 2-7 with supplementary transverse carinæ. Colour: 1-2 dark brown, rest black, marked with pale lemon-yellow (greenish-yellow in mature specimens) as follows:—1, base yellow, a short dorsal mark and two small anal spots, sides also yellow—2, a distinct longitudinal dorsal ray, constricted in the middle by the supplementary carina, which divides the segment slantingly; a pair of indistinct central spots, very small, bordering the carina above and inclined to the dorsal ray, a pair of small anal spots; sides yellow, sutures with transverse brown rays, a brown line along the central carina; spurs very small, angulated, lemon-yellow; genital appendages not prominent—3, a fine dorsal line slightly thickened basally and broken by the carina; a pair of small central spots just below the carina and very close together; a pair of larger anal spots, wide apart; sides yellowish, except sutures and carina,

which are brown—4-7, a fine dorsal line, a pair of small round central spots close together, a pair of longitudinal spots wider apart, very little yellow on sides—8, a touch of yellow at base, a pair of spots one-third from base, a pair of large anal spots, wider apart—9, a pair of very small spots at base; a pair of anal spots wide apart—10, a pair of anal spots. Appendages: *superior* long and slender, 5 mm., narrow sublanceolate, black; projecting slightly below inwards just before half-way so as to form a very obtuse ledge, carrying a series of longish hairs on inner margin. *Inferior* nearly straight, slightly upcurved, hollow above, narrow subtriangular, 2 mm. (Plate v. figs. 2 and 3—the hairs are not quite as dense as shown).

♀. Very similar to ♂ but somewhat larger. Total length 60-65 mm.; abdomen 48-50 mm.; fore- and hindwings 39-41 mm.; pterostigma paler. Abdomen slightly thicker than in ♂, marked as in ♂, but the longitudinal dorsal ray more conspicuous, wider on first half of seg. 2, and on 3-7 slightly enlarged basally into a small triangular area; 9 somewhat larger than 8, 4 mm. long; 10 very short and narrow. Ovipositor with a very long and narrow spike, dark brown, reaching to below the end of 10 (*not* shown in the Plate); anal end of 9 carrying below two small 2-jointed filaments; 10 projecting below into a conspicuous tongue furnished with two prongs or forks curving downwards, their length being about equal to the distance which the tongue itself projects beyond the base of the rounded end of 10; this rounded end forming a pale downy tubercle placed above the tongue. Appendages very fragile [nearly always missing], 3 mm., dark brown, slender, leaf-like, narrow lanceolate, with hairs on inner margin. (Plate v. figs. 4, 5).

Hab.—Northern and Central Queensland: Rockhampton; Cooktown (February).

Types: The male is in my collection, the female in Coll. de Selys.

EXPLANATION OF PLATE V.

Fig. 1.—*Austrogynacantha heterogena* ♂, nat. size.
Fig. 2. ,, ,, ,, appendages seen from above.
Fig. 3. ,, ,, ,, ,, seen sideways.
Fig. 4. ,, ,, ♀, ,, seen from above.
Fig. 5. ,, ,, ,, ,, seen sideways.
Fig. 6.—*Gynacantha Rosenberghi* Selys ♂; anal triangle of hindwing.
Fig. 7.—*Austrogynacantha heterogena* ♂; venation of basal portion of hindwing.
Fig. 8.—*Gynacantha Rosenberghi* Selys; portion of forewing, showing curvature of nodal sector.
Fig. 9.—*Austrogynacantha heterogena*; portion of forewing, showing curvature of nodal sector.

WEDNESDAY, JULY 29TH, 1908.

The Ordinary Monthly Meeting of the Society was held in the Linnean Hall, Ithaca Road, Elizabeth Bay, on Wednesday evening, July 29th, 1908.

Mr. J. H. Maiden, F.L.S., Vice-President, in the Chair.

Mr. GEORGE I. PLAYFAIR, Auburn, was elected an Ordinary Member of the Society.

The attention of Members was called to a circular received from the Hon. Secretaries of the Anderson Stuart Testimonial Fund.

A letter from the Royal Society of South Australia was read, urging "the necessity for legislation to preserve the fauna of New South Wales. This, it is thought, may be possibly best effected by providing for the complete protection of the fauna in all the forests of the State, in any legislation which may be introduced on the Report of the Royal Commission on Forestry" now exercising its functions.

A letter from the Advisory Committee *re* Fisheries and Game Acts in Victoria, Melbourne, inviting the Society's co-operation in approaching the Federal Government with a view to the prevention of the export of the plumes or skins of Egrets, Lyrebirds, Birds of Paradise, &c., as one means of checking the destruction of native birds, was also read. The recent introduction, to the British Parliament, of the Prohibition of Plumage Importation Bill, by Lord Avebury, suggests that the present time is a suitable one for taking actio n in Australia

At the next Meeting of the Society, on 26th August, it is proposed to afford the Members the opportunity of considering the two propositions outlined above, as part of the general question of the welfare of the flora and fauna, and the best means of

safe-guarding it. Members are requested therefore to extend invitations to be present to others who are interested in the question. Country Members who are unable to attend are requested to forward statements of their views and experiences. The last Presidential Address (Proceedings, 1908, pp.28-37) may advantageously be kept in mind.

At the present time there are two Acts in force in this State having for their object the protection of certain species of birds and mammals—the "Birds' Protection Act, 1901," and the "Native Animals' Protection Act, 1903."* What has been the outcome of the introduction of this legislation? Evidence bearing upon this and cognate matters is especially asked for.

The Donations and Exchanges received since the previous Monthly Meeting, amounting to 22 Vols, 64 Parts or Nos., 17 Bulletins, 8 Reports, and 15 Pamphlets, received from 56 Societies, &c., and one Individual, were laid upon the table.

* Copies of these documents are procurable at the Government Printing Office.

NOTES AND EXHIBITS.

Mr. Froggatt showed a specimen of a beautiful neuropterous insect, with curiously modified hind wings, *Chasmoptera huttii*, from West Australia. The species was described and figured by Westwood in 1847 (Trans. Ent. Soc. London, v., Journ. Proc. p.xxvii., pl. viii. fig. 1), two specimens at that time having reached England. Mr. Du Boulay had recently been successful in rediscovering this interesting form.

Mr. Palmer exhibited a fine series of examples of aboriginal chipping work from the north-west coast of Australia, illustrating the aptitude of the Blacks in utilising material which civilisation had brought within reach—glass-bottles, insulators, &c.—for fashioning spear-heads; specimens of the curious bird-like flowers of *Crotalaria Cunninghamii* R.Br., from West Australia; and, from Lawson, Blue Mts., a remarkable coccid gall (*Brachyscelis duplex* Schrader) and some heteromerous coleoptera.

Mr. Musson sent, for exhibition, two examples of *Loranthus linophyllus* Fenzl, *in situ* upon unusual hosts, namely *Melaleuca linariifolia* Sm., and a cultivated Plum (var. Loutherboro') from the neighbourhood of Richmond, collected by Mr. R. Farlow.

Mr. W. S. Dun exhibited a series of specimens of Graptolites, collected by Mr. J. E. Carne, from Parish Inverary, County Argyle, on the Shoalhaven River about 12 miles from Tallong. These fossils prove a great extension of the Ordovician system in this State. The beds are of the same age as those developed in N.E. Gippsland of Upper Ordovician age; and in the Delegate and Berridale (Cooma) districts. The following genera and species are represented :—*Climacograptus affinis*, *Diplograptus foliaceus* and *D.* sp., *Dicranograptus*, *Dicellograptus affinis* and *D.* sp.

Mr. A. A. Hamilton exhibited (1) a specimen of *Pterostylis grandiflora* R.Br. [N.O. Orchideæ], from the Federal Pass, Katoomba (April, 1908), with a terete foliaceous bract about 1 in. long, springing from the base of the upper stem-leaf, a character not mentioned in descriptions; the examination of specimens in the National Herbarium, Botanic Gardens, disclosed an example from Kurrajong Heights with a similar bract, and one from Cook's River with the bract partially developed—(2) Specimens of *Baeckea crenulata* R.Br. [N.O. Myrtaceæ] from Mt. King George (J. Gregson; January, 1908), Woodford (J. H. Maiden; January, 1899), and Leura (A. A. Hamilton; December, 1907), showing that this plant, hitherto recorded from the coastal districts, has a wide range on the Blue Mountains.—(3) A specimen of *Paspalum brevifolium* Flügge, from Cook's River (A. A. Hamilton; February, 1908) described in the 'Flora Australiensis' as with "Spikes or panicle branches 2 or rarely 3"; whereas it was the rule rather than the exception for plants in the patch, from which the specimens exhibited were taken, to have 3-6 spikes.

THE ACIDITY OF MILK

By H. G. Chapman, M.D., B.S., Demonstrator of Physiology in the University of Sydney.

(From the Physiological Laboratory of the University of Sydney).

The reaction of milk is commonly stated in text-books to be alkaline or neutral. This statement is made with regard to the behaviour of litmus indicator towards cow's milk and for milk examined in Europe and America. In the more recent accounts,* however, authors note the amphoteric nature of the reaction By this term attention is drawn to the fact that milk behaves as an alkaline fluid towards indicators sensitive to basic substances and as an acid fluid towards those sensitive to acid substances. Red litmus paper is turned blue, and blue litmus paper red.

This amphoteric reaction depends upon the dissolved constituents of the milk. It is principally related to the amounts of dihydrogen and monohydrogen phosphate present in solution.

When acids or alkalies are added to a solution of phosphates an acid or alkaline reaction does not develop at once, and free acid and free alkali are not present in the liquid until a certain quantity of acid or alkali has been added. If, for example, hydrochloric acid is added to a solution of mixed phosphates, there is no free hydrochloric acid present at first, but the acid

* Raudnitz, Ergeb. f. Physiol. 1903, Abt.1, S.300.

reacts with monohydrogen phosphate to form dihydrogen phosphate. This change may be represented—

$$Na_2HPO_4 + HCl = NaH_2PO_4 + NaCl.$$

Similarly, when soda is added to a solution of mixed phosphates the reverse change occurs and dihydrogen phosphate is converted into monohydrogen phosphate. Thus—

$$NaH_2PO_4 + NaOH = Na_2HPO_4 + H_2O.$$

In these cases no free acid or alkali will be present until all the phosphate has been converted into the acid or basic phosphate as the case may be.

When this change is considered from the standpoint of the concentrations of hydroxyl and hydrogen ions* certain important applications become evident.

In distilled water ionisation occurs to a slight extent and H and OH ions are both present in relatively equivalent concentrations. If to this distilled water we add sufficient acid to make a solution of $\frac{N}{5000}$ then we have a great increase in the concentration of H ions and a relative diminution of the concentration of OH ions. In other words, we have a weak acid but a definitely acid solution. Similarly the addition of alkali to make a $\frac{N}{5000}$ solution will lead to an increase in the concentration of OH ions and a relative diminution in the concentration of H ions.

But if to a solution of mixed phosphates of similar concentration to the phosphates in milk, acid is added, then the amount of acid must be $\frac{N}{5}$ before the acid properties develop. Here the addition of acid causes no rapid change in the relative concentrations of H and OH ions, but instead there is the change in the phosphatic type shown above. If, on the other hand, to the phosphatic solution base is added, then sufficient alkali must be added to raise the alkaline content to $\frac{N}{20}$ before the concentration of OH ions becomes markedly increased and the concentration of H ions relatively diminished. In distilled water the addition therefore of a small quantity of acid or alkali is sufficient to

* Compare Moore, and also Whitley, Biochem. Journ. Vol.i. 1906.

produce an excess of H or OH ions as the case may be. To pass from an excess of H ions to an excess of OH ions, only the addition of a small amount of alkali is required. But, on the other hand, in the solution of phosphates the points at which an excess of H or OH ions occurs are widely separated and much more acid or alkali must be added to pass from one side to the other.

The phosphates thus possess a regulating influence on the concentration of H and OH ions. In such a solution the concentrations of the two opposed ions may be regarded as mutually equivalent. The addition of acid or alkali will not alter these concentrations until much acid or alkali is present. The fluid will thus exhibit the characters of a neutral fluid, should small amounts of acid or alkali be added to it. Important applications of this regulating mechanism have been noted in the case of blood-serum, lymph, and urine as well as with milk.

During 1906 a large number of samples of milk obtained in New South Wales have been examined. In the case of milk bought in Sydney the reaction to litmus paper has been acid. This has been the case with every sample obtained, even with those that have been brought from the dairy to the laboratory in the morning. On first notice this acidity was ascribed to lactic acid. On neutralisation of this acidity with $\frac{N}{10}$ NaOH the behaviour was no longer that of fresh milk.* A little investigation showed that the acidity was not due to lactic acid present in the milk. Attention was then paid to milk immediately after removal from the cow, and my friend, Mr. J. M. Petrie, D.Sc., made a number of determinations at Singleton, for which I am greatly indebted to him.

To determine the capacity of milk to combine with alkali the milk has been titrated with $\frac{N}{10}$ NaOH, using phenolphthalein as

---

* See Moseley & Chapman, Proc. Linn. Soc. New South Wales, Vol. xxxi. p. 568, 1906.

indicator. It has been found that, when 1 c.c. of a 0·1 % alcoholic solution of phenolphthalein has been present in 100 c.c. liquid, it has been easy to determine the first appearance of the pink colour. The figures obtained have been found to vary with the method of titration adopted. After much experiment the following method has been adopted, and this has been used for all titrations.

25 c.c. milk have been added to a beaker which has contained 100 c.c. distilled water (free from CO_2) and 1 c.c. phenolphthalein solution. $\frac{N}{10}$ soda has then been run in until the first pink colour has been observed.

When the method is varied, different results have been obtained. Thus with the same milk the following results have been found:

25 c.c. milk plus 1 c.c. phenolphthalein, at 17° C, required 4·2 c.c. $\frac{N}{10}$ NaOH.
25 c.c. milk plus 1 c.c. phenolphthalein,
plus 50 c.c. water ... ... ,, ,, 3·4 c.c. ,,
25 c.c. milk plus 1 c.c. phenolphthalein,
plus 100 c.c. water ... ... ,, ,, 3·35 c.c. ,,
25 c.c. milk plus 1 c.c. phenolphthalein,
plus 100 c.c. water ... ... at 70° C, ,, 3·8 c.c. ,,

It has been invariably found that heating the milk increased the amount of alkali to be added, and that dilution diminished the amount up to a certain figure, and then further dilution produced only a slight effect.* It is customary to designate the number of cubic centimetres of decinormal soda used to neutralise 100 c.c. milk as so many degrees of acidity. The figures obtained for 25 c.c. milk have been multiplied by 4 to obtain this figure.

Upon determining the degree of acidity of milk within one minute after its removal from the mammary gland of the cow, it has been found to vary from 12° to 19° acidity in 14 cows. The figure for the mixed milk of the 14 cows at the end of milking

*Compare Söldner, Landw. Vers.-Stat., Bd. 35, S. 354, 1888; and Siegfeld, Hildesheim. Molkereiztg., 1900.

was 15·5°. All these samples turned blue litmus paper red and red litmus paper blue. Fluid litmus solution was turned red. The samples were all without effect upon Congo red paper, which detects free acid. The cows were tested on December 18th at a farm on the Hunter River, 150 miles north of Sydney, at about 4.45 a.m. The detailed figures are given in Table i.

Table i.

No.	Temperature.	Acidity in degrees.	Red litmus paper.	Blue litmus paper.	Congo red paper.
1	32°C	14	blue	red	neutral
2*	26°C	15	,,	,,	,,
2†	36°C	13·5	,,	,,	,,
2‡	30°C	13	,,	,,	,,
2§	30°C	14	,,	,,	,,
3	36°C	15	,,	,,	,,
4	30°C	15	,,	,,	,,
5	31°C	17	,,	,,	,,
6	34°C	19	,,	,,	,,
7*	27°C	15·5	,,	,,	,,
8*	27°C	15	,,	,,	,,
9*	27°C	16·5	,,	,,	,,
10*	29·5°C	16	,,	,,	,,
11*	29·5°C	16	,,	,,	,,
12*	29·5°C	16	,,	,,	,,
13†*	28°C	12	,,	,,	,,
13§*	28°C	14	,,	,,	,,
14*	28°C	17	,,	,,	,,
Mixed milks*	29°C	14·5	,,	,,	,,

A determination has been made of the rate at which the acidity alters in a sample of milk. This milk was drawn into an open vessel kept covered from dust though air freely entered. The results are recorded in Table ii.

* Cooled quickly.
† First drawn milk.
‡ Last drawn milk.
§ Average sample from milking pail.

Table ii.

Time.	Age of Milk.	Temperature of Milk.	Acidity.	Blue litmus paper.	Red litmus paper.	Remarks.
4.45 a.m.	1 min.	32°C	14°	faint red	faint blue	
5.45	1 hour	28°C	13°	,,	,,	
6·45	2 hours	26°C	13°	,,	,,	
7.45	3 ,,	27°C	13°	,,	,,	
8.45	4 ,,	28°C	12·5°	,,	,,	
9.45	5 ,,	30°C	12°	red	,,	
10.45	6 ,,	32°C	12°	,,	,,	
noon.	7¼ ,,	34°C	11°	,,	,,	
12.45p m.	8 ,,	34°C	12°	,,	,,	
1.45	9 ,,	36°C	13°	,,	,,	
2.45	10 ,,	35°C	13°	,,	,,	
3.45	11 ,,	35°C	18°	,,	,,	
4.45	12 ,,	35°C	21°	very red	,,	
5.45	13 ,,	34°C	28°	very red	unchanged	smell suspicious, not acid to taste
6.45	14 ,,	33°C	29·5°	,,	,,	sour to taste
6.45 a.m.	26 ,,	—	90°	,,	,,	thick and sour
9.45 a.m.	29 ,,	—	90°	,,	,,	thick and sour

These figures show that the acidity slightly diminishes until the eighth hour and then increases slowly until the eleventh hour, after which the rate of increase is greater.

The figures for a large number of milks which had been mixed together have been determined at the delivery depôt of a milk factory. The longest interval between milking and titration was under three hours. These results are recorded in Table iii.

Table iii.

No.	Acidity.	No.	Acidity.
1	12°	11	13·5°
2	12°	12	12°
3	12·5°	13	14·2°
4	12·5°	14	14·5°
5	13°	15	14°
6	13°	16	13·5°
7	14°	17	14°
8	15°	18	13·5°
9	13°	19	12·5°
10	13°	20	13·5°

These figures show the acidity to vary from 12° to 15°.

The number of milks that have been estimated in Sydney has been large, and only a consecutive number are recorded in Table iv.

Table iv.

Milk.	Acidity.	Milk.	Acidity.
1	14°	9	16°
2	20°	10	13°
3	18°	11	14·5°
4	19·2°	12	16·4°
5	15°	13	15·2°
6	15°	14	14·8°
7	18·8°	15	13·6°
8	17°		

These figures cannot be compared with those in the other Tables, since it is not known how old the samples were. In some cases in which the source was known the acidity was higher (18° to 20°) than in country milk (12° to 15°).

It is interesting to note that the acidity of milk bought in Sydney does not alter for some hours even when kept at a temperature of 37° C. Thus, one sample giving an acidity of 16° at 9.30 a.m., showed no alteration at 12.40 p m.; and at 5.40 p.m., after 5 hours in the water bath at 37° C, gave the same figure upon titration. In some cases the acidity commenced to rise towards the end of 6 hours' incubation.

As mentioned previously, the acidity of the milk was at first ascribed to lactic acid. This view became untenable when it was found that $CaCO_3$ even after hours failed to greatly reduce the acidity. In a sample of milk of acidity 17·6°, after some hours contact with $CaCO_3$ at 70° C the acidity was 16°. In this sample the lactate was directly estimated and was found to be equivalent to only 0·25 c.c. $\frac{N}{10}$ NaOH for each 100 c.c. milk.

Samples of milk of known acidity have been filtered through Chamberland filters under a pressure of 4 atmospheres. The filtrate is perfectly clear with a faint yellow tinge when viewed in quantity by reflected light. The acidity of the filtrate

is low, being 5° or less. Filtration through porcelain removes not only the fat and caseinogen but also the greater part of the phosphate which is present in suspension, not in solution.

In 100 c.c. milk there has been found 0·236 gm. P_2O_5, while in 100 c.c.* of the filtrate through porcelain has been found 0·082 gm. P_2O_5. Since caseinogen contains phosphorus, a determination of the phosphate not combined with caseinogen has been made. 20 c.c. milk were heated to 70°C and mixed with 20 c.c. 2 % acetic acid, likewise heated to 70°C. After a few minutes' standing the precipitate was filtered off. Of the filtrate 32 c.c. were collected and considered to correspond to $\frac{32}{40}$ths of the 20 c.c. milk. The phosphate was estimated by calcining with excess of pure soda, by precipitation with ammonium molybdate and by weighing the phosphate in the latter precipitate as magnesium pyro-phosphate The weight of P_2O_5 uncombined with caseinogen in the milk has been found to be 0·175 gm. A little more than one-half of the uncombined phosphate was thus removed by filtration through porcelain.

In the sample of milk under consideration the acidity was 12° and the total phosphate equivalent to 0·236 gm. P_2O_5% of which 0·175 gm. P_2O_5% was uncombined with caseinogen, while after filtration the acidity fell to 4° and the phosphate to 0·082 gm. P_2O_5%.

From these figures it is evident that the increased acidity of the whole milk is due not only to the presence of phosphates but also to the caseinogen which possesses similar powers of changes from dicaseinate to monocaseinate and *vice versâ*.

In conclusion I beg to record my thanks to Professor Anderson Stuart, in whose laboratory this investigation was carried out.

* 100 c.c. filtrate corresponds more nearly to 112 c.c. milk than to 100 c.c. milk.

ON THE GENUS *NANNODYTHEMIS*, WITH DESCRIPTIONS OF NEW SPECIES.

[Neuroptera: *Odonata.*]

By R. J. Tillyard, M.A., F.E.S.

(Plate vi.)

The genus *Nannodythemis* was proposed in 1868 by Brauer* to receive an aberrant species of the *Libellulinæ* from Australia, which became the type under the name of *N. australis*. It is a short stumpy-looking insect with brilliant red abdomen; and as it sits about on the reed-stems, with its wings depressed and abdomen curved, it irresistibly suggests some kind of wasp. Brauer's specimens were from Moreton Bay, Queensland, and I have found it to be fairly common in coastal swamps in New South Wales, especially at Byron Bay.

While on a visit to Western Australia, in January, 1907, I found in a swamp at Wilgarrup, near Bridgetown, an insect very similar to the above species. I took it to be *N. australis*; but, later on, when I had the two series side by side in my collection, I could see considerable differences, not only of size, but of venation and colouration; and I made a note suggesting that the Western Australian form was a new species. However, as I possessed no description of Brauer's species and had not seen the types, I published the western species as *N. australis* Brauer,† only remarking on the greater size of the western form. Later on I wrote to Dr. Ris, the expert on *Libellulinæ*, and to M. René Martin, mentioning these circumstances, and I was glad to find that they too had recognised, in de Selys' collection, two distinct

---

* Brauer, Verh. zool-bot. Gesell. Wien, xviii. pp.369, 726(1868).

† See "The Dragonflies of Western Australia," these Proceedings, 1907, Vol.xxxii., p.723.

forms of *Nannodythemis*. I also obtained the information that Brauer's species was, as I had expected from its locality, most certainly the smaller form.

I now had materials for a short paper on the genus; but there was a further surprise in store for me. After making careful descriptions of the two species, I paid a visit to Wentworth Falls, hoping to get a better series of *N. australis* than I had at the time. There I took, in February of this year, two distinct species of this genus, one of which was certainly *N. australis*, but the other quite distinct from it and from the western form. Of the new form I was unfortunately only able to take four males and two females, but these, with my long series of the other two species, are sufficient to determine accurately the existence of three distinct but closely allied species of the genus.

Brauer distinguished his genus *Nannodythemis* from *Nannophya* Rambur* chiefly by the fact that the triangle of the hindwing is normal (*i.e.*, three-sided) in *Nannophya* while in *Nannodythemis* it is abnormal (*i.e.*, quadrilateral). Now in the two new species before me, which are evidently so closely allied to Brauer's *N. australis* that there can be no doubt as to their being congeneric, we find the following remarkable fact:—in the western form, the triangle of the hindwing in both sexes is normal; in the form from Wentworth Falls the males have normal triangles, while the two females I possess have an abnormal triangle in the hindwings. The former should then be placed in *Nannophya*, together with the male of the latter; while the female of the latter is a true *Nannodythemis*! The solution of this difficulty is an obvious one. Brauer, in creating the genus *Nannodythemis*, chose in defining it a variable character, which, far from being of true generic value, is not even of specific value. I can even find in my series of *N. australis* several individual specimens which possess a normal or nearly normal triangle in the hindwings, either on one side only or on both; while in my series of the western form careful examination reveals the

* Rambur, Ins. Névr. p.27(1842).

beginnings of a fourth side in one or two specimens. This extreme variability of the hindwing triangle causes it to lose absolutely its generic value, and the only course open to us is to suppress *Nannodythemis* Brauer, in favour of the older genus *Nannophya* Rambur. If the name *Nannodythemis* is to be retained at all, it must be used only as indicating a geographical subgroup of the principal genus *Nannophya*, to include the three Australian species which are so closely allied. And in this sense only I will retain the name in this paper, as I prefer that Dr. Ris should deal more fully with the two names in his great work on the "Libellulines" which will shortly be published..*

I propose to name the Western Australian form *N. occidentalis*, and to give to the third species (that from Wentworth Falls) the name of *N. Dalei* in memory of de Selys' great friend, the well-known British entomologist Mr. Dale; this name having already been applied by de Selys to this species on the label in his cabinet. In order to understand fully the differences between these three closely allied species, I will include a careful description of *N. australis* Br., taken from my own series.

1. N. AUSTRALIS Brauer. (Plate vi. fig. 1).

♂. Total length 20-21 mm.; abdomen 13-13·5 mm.; forewing 14-14·5, hindwing 13·5-14 mm. Wings well rounded, neuration black, bases very slightly or not at all saffroned in mature specimens; in some less mature specimens there is saffroning up to arculus of forewing and from base to behind nodus of hindwing. *Pterostigma* 1 mm., dark brown between the black nervures, outer portion just whitish. Sectors of *arculus* arising together at or near its base. *Triangle* of forewings abnormal, the two portions of the upper side being practically equal; *triangle* of

* I have to thank Dr. Ris for showing me the generic difference; I myself did not possess the published definitions of the two genera until recently. Hence while I must put on record the two new species for inclusion in Dr. Ris' great work, I feel I should leave the full discussion of the generic differences to him who first discovered them.

hindwings also abnormal, the proximal portion of the upper side twice as long as the distal portion.* One cross-nervure in submedian space of forewing; *two* in that of hindwing. *Membranule* almost nil. *Nodal Indicator* following triangle of forewings $\begin{matrix}5 & 4\\ 4 & 4\end{matrix}$ three to five single cells (generally five). Head: *eyes* dark brown, paler beneath; *vertex* very small, tubercled, dull greyish or blackish, *antennæ* 1 mm., black; *front* well rounded, slightly indented behind medially, shining olive-grey, with stiff black hairs; *clypeus* olive-grey, hairy; *labrum* and *labium* ochreous, *mouth* edged with black. Thorax: *prothorax* dull blackish. *Meso-* and *metathorax* downy, black, carrying above, in the less mature specimens, a pair of narrow nearly straight antehumeral bands, bright lemon-yellow, about 2 mm. long, and slightly indented or hooked inwards anally; sides of thorax with a broader straight lateral yellow band followed by a less regular and slightly narrower black band below, then an irregular sublateral yellow band, then a wavy black line in the suture; rest of sides and underside yellowish; *notum* black, scuta and scutella yellow. *Legs* black with stiff spines, coxæ touched with yellow. In the more mature insect all these markings are obliterated by a covering of dull dark greyish pruinescence. Abdomen: 1-2 slightly enlarged, 3-5 very narrow cylindrical, 6 widening, 7-9 strongly dilated, flat underneath, 10 narrower. Colour: in the less mature insect, 1-6 black marked with orange-yellow as follows—1, an anal transverse band or two elongated anal spots; 2, orange, with a large dorsal area of black of variable shape, but generally much enlarged in the middle and stalked basally; 3, a pair of large basal spots, a pair of central spots, and a pair of very small anal spots, having an irregular black dorsal area, stalked basally, but very variable in shape; 4, a pair of basal spots and a pair of elongated central spots, or sometimes one long patch on each side; 5, an elongated spot on each side; 6, a larger suboval patch on each side. In the more mature insect 1-3 are covered with dull grey pruinescence, the sutures, dorsal ridge,

* I possess one or two specimens with the triangles practically normal.

and transverse carinæ shining black; 4-5 nearly black, the orange markings more or less obliterated; 6 with the large spots red; 7-10 brilliant red, each segment sometimes with a more or less regular transverse anal black band, and sometimes unmarked except for a black point at the tip of the segment, low down on each side. Appendages: *superior* 0·8 mm., narrow, wavy, sublanceolate, carrying a few fine hairs; just touching near tips; pointed, red. *Inferior* 0·6 mm., subtriangular, tip slightly upcurved, orange-red.

♀. Total length 19-21 mm; abdomen 12·5-13·5 mm.; forewing 15-16 mm.; hindwing 14·5-15·5 mm. Wings as in ♂ but with a considerable amount of saffroning, extending in forewings nearly to arculus, and in hindwings covering a larger area nearly to arculus, lighter along costa, and another light patch along nodus. Head: *eyes* paler than in male, bright ochreous underneath; *front*, *clypeus* and *labrum* yellower than in male. Thorax as in the less mature male. Abdomen wider and more cylindrical than in male; colour black, marked with orange as follows—1, a transverse anal band; 2, sides orange crossed by a thick black line on the transverse carina; 3, a large orange patch on each side; 4-6, an elongated oval spot or patch on each side; 7, a very large oval spot on each side; 8, a smaller subtriangular spot on each side; 9, a pair of small basal lateral spots; 10, black, suture orange. Underside black with large semielliptical yellowish spots on either side of each segment, 2-6 downy beneath. Appendages separate, 0·4 mm., subconical, pointed, hairy, orange with black tips.

Hab.—Queensland: Moreton Bay—New South Wales: Byron Bay, National Park, Wentworth Falls, and probably on all coastal swamps and mountain bogs. It appears at the end of September, when it may be found sitting in characteristic attitude on the reed- and grass-stems, with wings very much depressed and abdomen somewhat curved inwards. It continues on the wing until February. Its flight is irregular, close to the surface of the water, or in and out among the reed-stems. The females are less active and are found in the thicker parts of the reed-beds.

2. N. Dalei, n.sp. (Plate vi. fig.2).

♂. Total length 23-25 mm.; abdomen 15-16 mm.; forewing 17·5-18·5 mm., hindwing 16·7-17·7 mm. Wings: neuration black, bases touched with saffron for 1 mm. in forewings and 1·5 mm. in hindwings. *Pterostigma* 1·3-1·6 mm., black, touched with white at inner end and with a small triangular area of white at its outer end. *Only one* cross-nervule in submedian space of all wings. *Triangle* of forewings abnormal, the proximal portion of the upper side about twice as long as the distal portion; *triangle* of hindwings normal. 2-3 single cells following triangle of forewings (generally 2). *Nodal Indicator* $\begin{vmatrix}5 & 5\text{-}6\\4 & 5\text{-}6\end{vmatrix}$ *Membranule* almost nil. Head: *eyes* brown, occipital triangle black above, yellow underneath, hairy; *vertex* and *antennæ* black; *front* well rounded, deeply cleft medially, yellow covered with thick black hairs, *a large black patch in front*; *clypeus* yellow, sometimes touched with black; *labrum* yellow with a small black patch in the middle; *labium* yellow, mouth edged with black. Thorax: *prothorax* black, with a small dorsal double spot, yellow. *Meso-* and *metathorax* jet black with fine hairs, a touch of yellow along the dorsal ridge; on each side an antehumeral lemon-yellow band, narrow, slightly indented or hooked inwards anally; sides bright yellow, with irregular black lines in sutures, underside yellow; *notum* black, scuta, scutella, and some small spots on wing-bases orange-yellow. In the more mature insect these markings are all much duller and darker, but I have seen no signs of pruinescence even on specimens taken as late as February. Abdomen broader and less pinched than in *N. australis*; 1-3 slightly enlarged, 4-5 very slightly narrower, 6 widening, 7-9 dilated, but not so much, proportionately, as in *N. australis*, 10 narrower. Colour: 1-4 orange-red marked with black as follows—1, a transverse black band; 2, dorsal area more or less widely black; 3, an irregular longitudinal dorsal black band or line, enlarged anally, the transverse carina more or less black; 4, a longitudinal dorsal black band, enlarged at both ends, very variable; 5-6 very variable,

bright red, a dorsal line or band of black, thick or thin, enlarged anally; 7-10 brilliant red; 7-8 sometimes touched with black dorsally; a touch of black in sutures. Appendages: *superior* 1 mm., separate, narrow, wavy, sublanceolate, carrying fine hairs, just touching near tips; red or orange-red touched with black at tips. *Inferior* 0·8 mm., subtriangular, tip slightly upcurved; orange.

♀. Total length 22 mm.; abdomen 14 mm.; forewing 17·5 mm.; hindwing 16·7 mm. Wings as in male, *except triangle of hindwings, which is abnormal.* Head as in male, *but lacking the black marks on front and labrum.* Thorax as in male. Abdomen shorter and thicker than in male, nearly cylindrical; colour orange or dull orange-brown, with an irregular longitudinal dorsal black band, and transverse basal and anal black bands on each segment; on each side a broad sublateral band of black reaching from middle of 3 to end of 8 and connected with the dorsal band by the transverse bands of each segment; underside yellowish, ventral carina blackish, 1-8 very hairy beneath.

Hab.—N.S.W.: Blue Mts., Blackheath, Katoomba, and Wentworth Falls, also National Park—Victoria: Mt. Macedon. Rare. October-February.

It inhabits mountain bogs and swamps; its flight and habits are very similar to the preceding species.

3. N. occidentalis, n.sp. (Plate vi. fig.3).

♂. Total length 24-27·5 mm.; abdomen 15·5-18 mm.; forewing 18-19·5 mm.; hindwing 17-18·5 mm. Wings: *neuration* black, bases strongly saffroned for 1-2 mm.; *pterostigma* 1·2-1·6 mm., black with a small white area along inner margin and a larger triangular white area along the outer margin. [The peculiar formation of the pterostigma is shown in the enlarged fig.4 in the plate]; *membranule* almost nil; *triangle* of forewings abnormal, the proximal portion about twice as long as the distal portion; *triangle* of hindwings normal;* *only*

* Slightly abnormal in one or two specimens.

one cross-nervule in submedian space of all wings; 1-4 single cells following triangle of hindwings (generally 1-2). *Nodal Indicator* 6 6-8 / 4 6-8 Head: *eyes* brown above, yellowish beneath; orbits black behind, spotted with yellow; *vertex*, *antennæ* and *ocelli* black; *front* cleft medially, pale yellow with thick black hairs; *clypeus*, *labrum* and *labium* mustard-yellow; *mouth* edged with brown. Thorax: *prothorax* black, a short yellow collar in front, a central yellow spot, and a larger anal yellow spot. *Meso-* and *metathorax* hairy, black, a touch of yellow along dorsal ridge; a pair of *broad* straight antehumeral yellow bands, somewhat hooked inwards anally, followed closely in front and behind by a small yellow spot; below, on each side, a thick black band; rest of sides yellow, with an irregular black mark in the sublateral suture running to the coxæ and sending a short transverse branch upwards to join the black groundcolour in front; *underside* mustard-yellow with a pair of elongated black spots and a round dot between them; *notum* black, scuta and scutella yellow; several tiny yellow points at the wing-bases. *Legs* black with stiff spines, coxæ yellow. Abdomen subcylindrical, flat underneath, 1-2 slightly swollen, 3-5 cylindrical, 6-9 dilated, but not so much as in the two preceding species, 10 narrower. Colour: 1, very small, black above, a transverse anal line, sides yellow; rest of abdomen brilliant red in the mature insect; 2, with a black dorsal mark, irregular, and generally shaped like a stalked goblet; a touch of black on sides and on transverse carina; anal ends of all segments more or less shaded with dull black, either as a narrow anal band or a dorsal spot and a pair of distinct, very small, sublateral spots; 10 short, red. In the teneral insect only the tip of the abdomen is red, the rest being orange, more or less marked with black. *Underside* orange, ventral carina black. Appendages: *superior* 1·2 mm., wavy narrow sublanceolate, bases separated, tips almost touching; slightly hairy, orange-red, pointed. *Inferior* 0·9 mm., subtriangular, tip slightly upcurved, dull orange; a small bunch of hairs beneath it on 10.

Mature males of this species show no signs either of pruinescence or any darkening of thorax and base of abdomen.

♀. Total length 24-26·5 mm.; abdomen 16-17·5 mm.; forewing 18-19·5 mm.; hindwing 17-18·5 mm. Wings as in male; bases more suffused with saffron (2-3 mm.), pterostigma somewhat larger. Head and thorax as in male. Abdomen broad, subcylindrical, 2-3 slightly narrower than rest, 4-8 broadening, narrower again. Colour: 1, black with basal and anal transverse yellow lines. Rest of abdomen either fulvous, brown or testaceous according to the individual and age; a more or less irregular black dorsal line all the way down, swelling out at both ends of each segment, very broad on 8-9. On each side an irregular black sublateral band along 2, half of 3, and 4 6 or 7; these two bands are connected with the dorsal band by transverse black bands across the sutures, those of 2-3 narrow, the others broader, and those of 7-9 separated by a fine orange line along the suture itself; 10, orange with a black basal spot. *Underside* very flat, orange, with the ventral carina broadly black; broad black bands across the sutures, carrying a pale spot on each side; 2-7 somewhat hairy beneath. Appendages 0·5 mm., wide apart, straight, pointed, slightly hairy, orange with blackish tips; separated by the tubercular projection of 10.

Hab.—South-Western Australia: Wilgarrup, near Bridgetown. Very rare. December-January.

Habits similar to those of the preceding species. It occurs in a tract of boggy country through which a small brook runs. It is a stronger and probably more active species than the other two, and has a zigzag and irregular flight.

In order to grasp more fully the important differences between these three closely allied species, I append a table of comparison for the chief characters in which they differ, in neuration, size and colouration.

It seems fitting here to make a remark upon the group of allied genera, placed by authors at the end of the *Libellulinæ*, which show an aberrancy in the formation of the triangle of one or both wings. Too much stress has been laid upon the possession of this remarkable property as regards its value in generic distinctions. There is no doubt of its importance, but there is also

Characters.	N. australis Br.	N. Dalei, n.sp.	N. occidentalis, n.sp.
Size:—			
♂. Total length	20-21 mm.	23-25 mm.	24-27·5 mm.
♂. abdomen	13-13·5 mm.	15-16 mm.	15·5-18 mm.
♂. forewing	14-14·5 mm.	17·5-18·5 mm.	18-19·5 mm.
♂. hindwing	13·5-14 mm.	16·7-17·7 mm.	17-18·5 mm.
♀. Total length	19-21 mm.	22 mm.	24-26·5 mm.
♀. abdomen	12·5-13·5 mm.	14 mm.	16-17·5 mm.
♀. forewing	15-16 mm.	17·5 mm.	18-19·5 mm.
♀. hindwing	14·5-15·5 mm.	16·7 mm.	17-18·5 mm.
Neuration:—			
Antenodals of forewing	5	5	6
Postnodals ,,	4	5-6	6-8
Antenodals of hindwing	4	4	4
Postnodals ,,	4*	5-6	6-8
Number of discontinuous postnodals	1	2	2-4
Ratio of proximal to distal portion of upper side of triangle of forewings	1 : 1	2 : 1	2 : 1
Triangle of hindwings	abnormal.	♂. normal. ♀. abnormal.	normal.
Number of cross-nervules in submedian space of hindwing	2 (rarely 3).	1	1
No. of single cells following triangle of forewings in discoidal area	3-5, generally 5.	2-3, generally 2.	1-4, generally 1-2.
Sectors of arculus arising	at or near base of arculus.	one-third from base of arculus.	one-third from base of arculus.
Position of inner angle of triangle of hindwing	slightly beyond arculus.	at arculus.	at arculus.
Colouration:—			
Pruinescence in adult ♂	complete on thorax and base of abdomen.	slight darkening of thorax.	nil.
Antehumeral thoracic stripes	narrow.	narrow.	broad.
Black mark on front	absent.	present in male.	absent.
Black markings on abdomen of male	on segs. 1-6.	on segs. 1-6 (smaller).	on segs. 1-2.
Shape:—			
Constriction of segs. 3-5	very considerable	moderate.	slight.
Dilatation of 7-9	very great.	considerable.	fair.

* One specimen with 6 on one side only.

no doubt that it is so subject to variation that it is a dangerous guide to generic division. In the case of *Nannodythemis* as defined by Brauer, the importance attached to it has been so great that, if insisted on, we are driven to the absurdity of placing the male of *N. Dalei in one genus* and the female *in another*. This is sufficient to show that it has no generic value whatever. But rightly regarded, it possesses for us a far deeper significance. For these "quadrilateral" *Libellulinæ* are survivals which take us back to a period long before the now dominant genera *Diplacodes*, *Orthetrum*, *Libellula* and many others had been formed. As *Nannodythemis*, *Nannophya*, and *Tetrathemis* are to the dominant *Libellulinæ*, so are *Neophya*, *Cordulephya* and *Pentathemis* to our present-day *Corduliinæ* (a group that can scarcely be called dominant). And in these three closely allied species of *Nannodythemis* we see taking place before our very eyes that excessive variation in the region of the triangle which was probably a heritage of an earlier period, when the "triangle" of the Anisoptera first became differentiated from the simpler quadrilateral cell of the Zygoptera. *N. australis* represents probably the oldest form, and tracing the gradual decrease of "abnormality" in the *hindwing* triangle through *N. Dalei* to *N. occidentalis*, we note the concurrence of greater size and more powerful build; the latter species suggesting at once that it would take but another step, viz., the change from an abnormal *forewing* triangle to a normal one, with another corresponding increase in size and strength of build, to give us the true Australian type of *Diplacodes* as represented by our *D. haematodes* or *D. bipunctata*. *Nannodythemis* then points to us the way by which the great dominant group of present-day *Libellulinæ* have ascended in the scale of development, and it is not impossible that a careful study of this and allied genera, both in the *Libellulinæ* and *Corduliinæ*, may yet reveal the exact hidden homology between those portions of the Anisopterid and Zygopterid wings which lie close to the arculus. With the aid of more material and careful study of individual variations in each species, I hope to give later on in another paper some

interesting details about these remarkable "quadrilaterals," whose home is Australia and Papua.

EXPLANATION OF PLATE VI.

Fig. 1.—*Nannodythemis australis* Br., ♂ ($\times 2\frac{2}{3}$).
Fig. 2.—*N. Dalei*, n.sp., ♂ ($\times 2\frac{2}{3}$).
Fig. 3.—*N. occidentalis*, n.sp., ♂ ($\times 2\frac{2}{3}$).
Fig. 4.—*N. occidentalis*, n.sp., pterostigma of hindwing of ♂ ($\times 11$).

STUDIES ON AUSTRALIAN MOLLUSCA. Part X.

By C. Hedley, F.L.S.

(Plates vii.-x.)

(Continued from Vol.xxx., p.546.)

Trophon paivæ Crosse.

(Plate ix., fig.18.)

A young shell, 3 mm. in length, of four whorls, is here shown. Two nepionic whorls are smooth and globose, the initial one set obliquely. Subsequent whorls are ornamented by about a dozen erect radial lamellæ, on the shoulder puckered into a spout and descending obliquely from whorl to whorl. As growth proceeds, the lamellæ do not enlarge in proportion, but multiply in number. Spiral cords appear on the fourth or fifth whorl, enlarge, and, on the sixth, predominate over the radials, which decrease to mere scales.

In early life the shell thus appears as a regular *Trophon*, but modification of sculpture in maturity has masked this affinity and induced authors to assign it to other genera. Hutton included *T. paivæ** in a genus *Kalydon* he had framed for Trophon-like shells without varices. In our waters that genus appears to me to be represented by *Ricinula adelaidensis* Crosse, and *Purpura neglecta* Angas. The apex of the latter† is quite different. In Moreton Bay *T. paivæ* appears to closely approach if not to merge into a large form which I take to be *Buccinum funiculatum* Reeve‡ and *Latirus strangei*.§

---

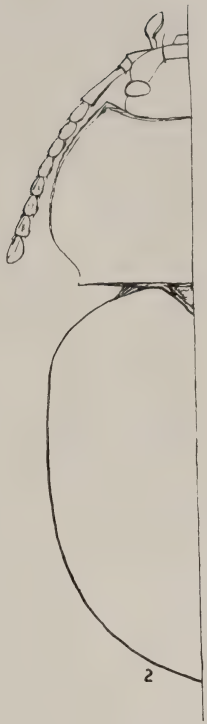
* Trans. N.Z. Inst. xvi. 1883 (1884), p.226.

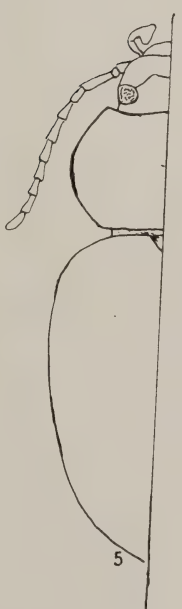
† Kesteven, these Proceedings, 1902, xxvi. p.714, Pl.xxxvi. f.2.

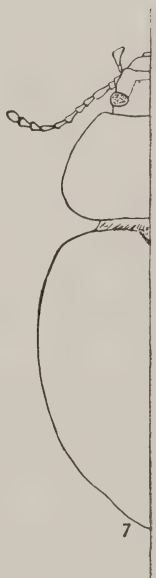
‡ Conch. Icon. iii. Buccinum, 1846, Pl.viii. f.61.

§ A. Adams, Proc. Zool. Soc. 1854, p.316.

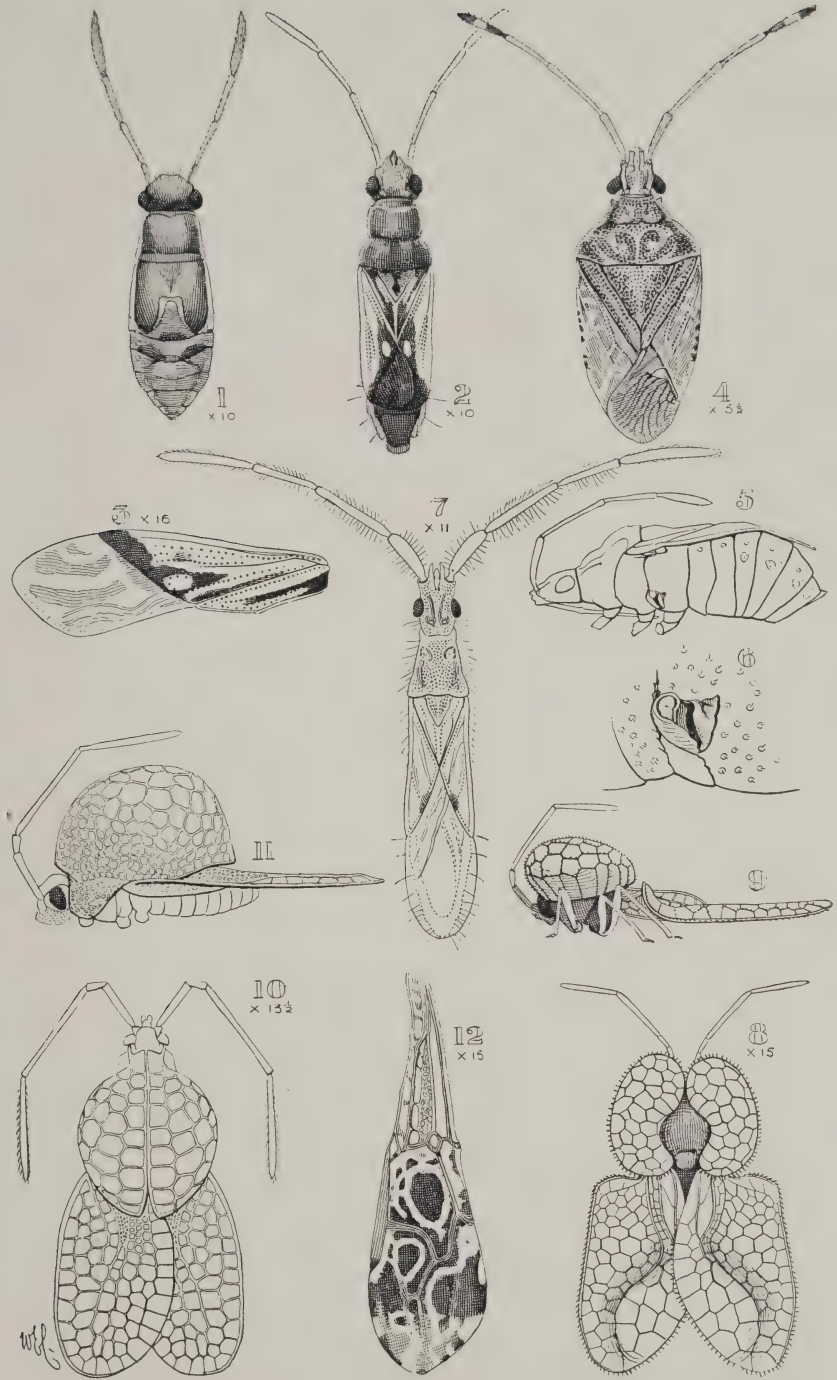
[Printed off August 13th, 1908.]







1.—Adelium barbatum.
2.—A. hackeri.
3 —A. subdepressum.
4.—A. canaliculatum.
7.—A. rotundum.
5.—A. bicolor.
6.—A. pestiferum.

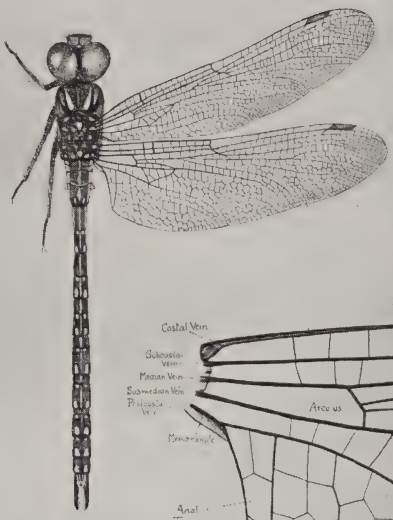


1.– Orthoea vincta.
2. ,, ,,
3. ,, ,,
4. Brachylybas variegatus.
5.—Brachylybas variegatus
6 ,, ,,
7.—Ontiscus vitiensis.
8. Nesocypselas dicysta.
9.—Nesocypselas dicysta.
10.—Holophygdon melanesica.
11. ,, ,,
12.—Ploiariodes medusa.

5.

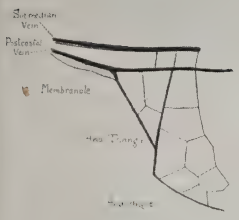
3.

4.

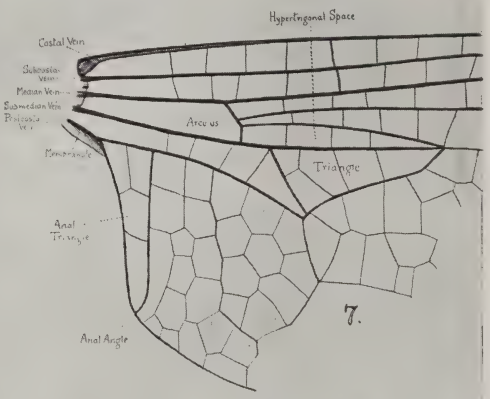


1.

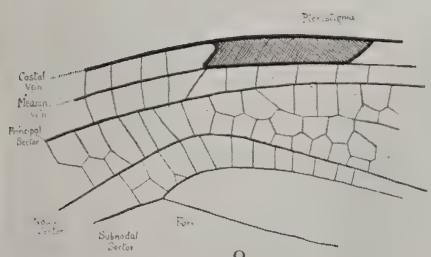
2.



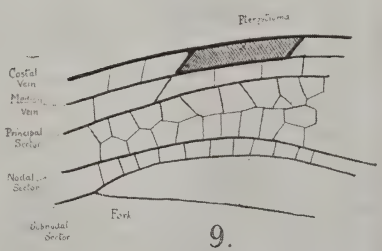
6.



7.



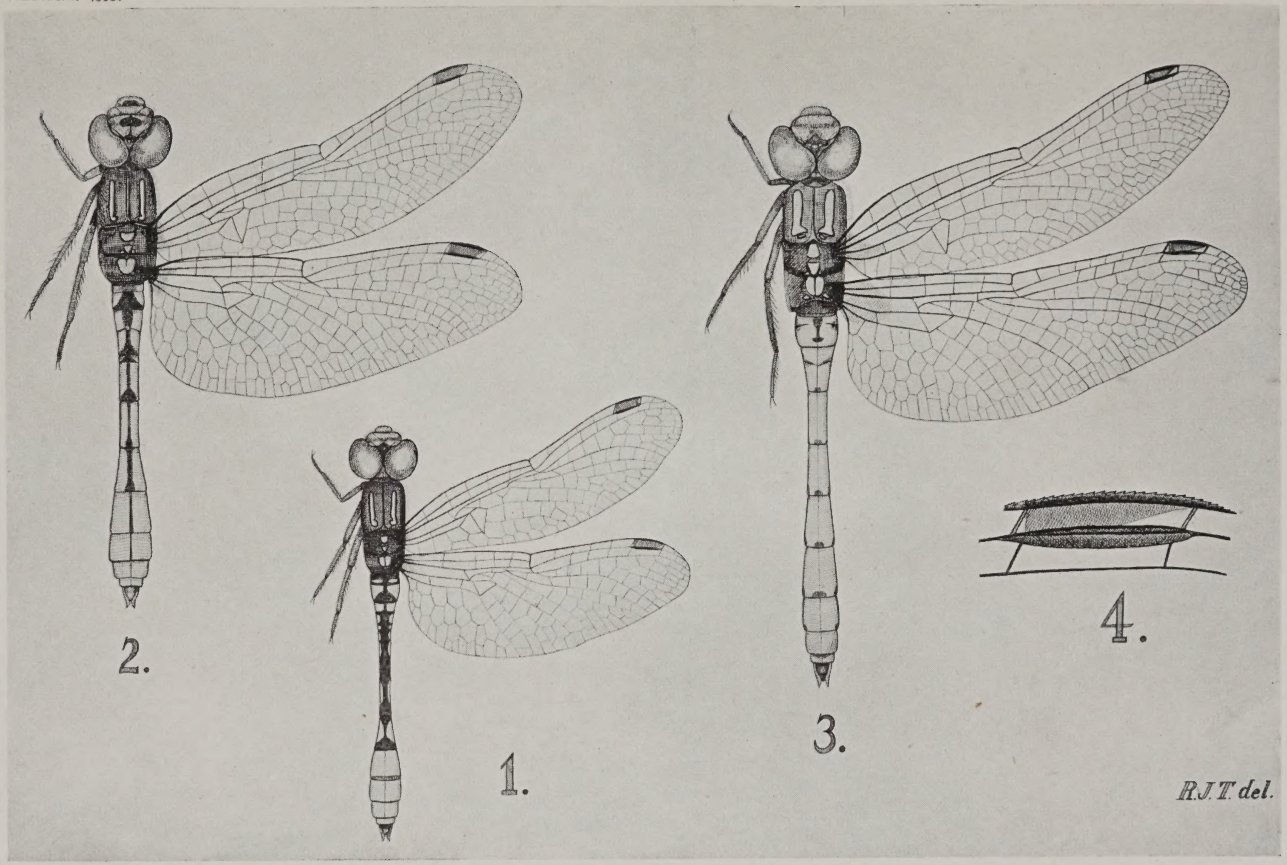
8.



9.

R.J.T. del.

1-5, 7 and 9.—Austrogynacantha heterogena. *6 and 8.—Gynacantha Rosenberghi* Selys.



1. Nannodythemis australis Br. *2. N. Dalei, n.sp.* *3-4. N. occidentalis, n.sp.*

SECOND SERIES *(continued)*.

Proceedings for 1900—Part 1, 8s.; Part 2, 10s. 6d.; Part 3, 10s. 6d.; Part 4, 17s. 6d.

Proceedings for 1901—Part 1, 10s.; Part 2, 9s.; Part 3, 5s.; Part 4, 17s. 6d.

Proceedings for 1902—Part 1, 7s.; Part 2, 7s. 6d.; Part 3, 7s. 6d., Supplement, 3s; Part 4, 15s.

Proceedings for 1903—Part 1, 9s.; Part 2, 12s. 6d.; Part 3, 14s.; Part 4, 15s.

Proceedings for 1904—Part 1, 10s.; Part 2, 7s. 6d.; Part 3, 9s.; Part 4, 10s.

Proceedings for 1905—Part 1, with Supplement, 7s.; Part 2, 10s.; Part 3, 12s. 6d.; Part 4, with Supplement, 10s. 6d.

Proceedings for 1906—Part 1, 12s. 6d.; Part 2, 12s. 6d.; Part 3, 12s. 6d.; Part 4, 15s.

Proceedings for 1907—Part 1, 8s.; Part 2, 8s. 6d.; Part 3, 15s.; Part 4, 18s.

Proceedings for 1908—Part 1, 7s.; Part 2, 9s.

A reduction of 20 per cent. on the above charges is made to Members of the Society.

The MACLEAY MEMORIAL VOLUME [issued October 13th, 1893]. Royal 4to., LI. and 308 pages, with Portrait, and forty-two plates. Price £3 3s.

CONTENTS.

The Hon. Sir WILLIAM MACLEAY, Kt., F.L.S., M.L.C. : (By the Editor).

Professor W. BALDWIN SPENCER, M.A. : Contributions to our Knowledge of *Ceratodus*. Part I.—The Blood Vessels. (Plates I.-V.) — Prof. F. W. HUTTON, F.R.S. : The Pliocene Mollusca of New Zealand. (Pl. VI.-IX.) — Prof. W. A. HASWELL, M.A., D.Sc. : A Monograph of the *Temnocephaleæ*. (Pl. X.-XV.) — Prof. W. A. HASWELL, M.A., D.Sc. : On an apparently new Type of the *Platyhelminthes (Trematoda?)* (Pl. XVI.)— Prof. T. JEFFERY PARKER, D.Sc., F.R.S., and Miss J. G. RICH : Observations on the Myology of *Palinurus Edwardsii*, Hutton. (Pl. XVII.-XXI). — Prof. J. T. WILSON, M.B., Ch.M., and C. J. MARTIN, M.B., B.Sc : Observations upon the Anatomy of the Muzzle of the *Ornithorhynchus*. (Pl. XXII. XXIII.) — Prof. J. T. WILSON, M.B., Ch.M., and C. J. MARTIN, M.B., B.Sc. : On the Peculiar Rod-like Tactile Organs in the Integument and Mucous Membrane of the Muzzle of *Ornithorhynchus*. (Pl. XXIV.-XXVI.) — C. HEDLEY, F.L.S. : On *Parmacochlea Fischeri*, Smith. (Pl. XXVII.) — Prof. R. TATE, F.L.S., F.G.S., &c. : On the Geographic Relations of the Floras of Norfolk and Lord Howe Islands — Baron von MUELLER, K.C.M.G., F.R.S. : Notes on an Undescribed *Acacia* from New South Wales. (Pl. XXVIII.) — Baron von MUELLER, K.C.M.G., F.R.S., and J. H. MAIDEN, F.L.S., F.C.S. : Description of a New *Hakea* from Eastern New South Wales. (Pl. XXIX.) — R. ETHERIDGE, Jun. : A Description of some of the Weapons and Implements of the Alligator Tribe, Port Essington, North Australia (Pl. XXX.-XXXV.) — N. A. COBB, Ph.D. : New *Nematodes* from Fiji and Australia. (Pl. XXXVI.-XLII.)

DESCRIPTIVE CATALOGUE OF AUSTRALIAN FISHES. By William Macleay, F.L.S. [1881]. A few copies only. Price £1, net.

The TRANSACTIONS OF THE ENTOMOLOGICAL SOCIETY OF NEW SOUTH WALES, 2 vols., 8vo [Vol. I. five Parts, 1863-66; Vol. II. five Parts, 1869-73; all published], price £2, net, are also obtainable, but neither the Parts nor the Volumes are sold separately.

PROCEEDINGS, 1908, PART 2.

CONTENTS.

PAGE

A Revision of the *Thynnidæ* of Australia [HYMENOPTERA]. Part ii. *continued* (pp.209-256). By ROWLAND E. TURNER, F.E.S. ... 209

Revision of the Australian Species of *Adelium* [COLEOPTERA: Fam. *Tenebrionidæ*]. By H. J. CARTER, B.A., F.E.S. (Plate iii.) ... 257

The Behaviour of *Hyla aurea* to Strychnine. By H. G. CHAPMAN, M.D., B.S., Demonstrator of Physiology in the University of Sydney 292

Notes from the Botanic Gardens, Sydney. No.13. By J. H. MAIDEN and E. BETCHE... 304

Contribution to our Knowledge of Australian *Hirudinea*. Part i. By E. J. GODDARD, B.A., B.Sc., Junior Demonstrator in Biology, Sydney University 320

A Catalogue of the *Hemiptera* of Fiji. By G. W. KIRKALDY, F.E.S. (Plate iv.) 345

Revision of the Genus *Seirotrana* [Fam. *Tenebrionidæ*], together with Descriptions of new Species of other Australian Coleoptera. By H. J. CARTER, B.A., F.E.S. 392

On the new Genus *Austrogynacantha* [NEUROPTERA: *Odonata*] with Description of Species. By R. J. TILLYARD, M.A., F.E.S. (Plate v.) 423

The Acidity of Milk. By H. G. CHAPMAN, M.D., B.S., Demonstrator of Physiology in the University of Sydney... ... ...

On the Genus *Nannodythemis* [NEUROPTERA: *Odonata*] with Descriptions of new Species. By R. J. TILLYARD, M.A., F.E.S. (Plate vi.) 444

Elections and Announcements 289, 343, 432

Notes and Exhibits 236, 290, 344, 434

NOTE.—Attention is called to the following preliminary list of corrigenda in Mr. Kirkaldy's paper:—

p.346, line 7, *for* STALAGMOSTHETUS *read* STALAGMOSTETHUS.
p.347, line 3, for *Mesocrypha corticicola* read *Nesocrypha corticicola*.
p.350, after line 25, read Fam. **ARADIDÆ**.
p.356, line 2 of footnote, after "genus" read *Cymoninus*.
p.367, for line 10 as printed, *read* LIMNOMETRA CILIATA Mayr, 1865, Verh. zool. bot. Ges. Wien, xv. 444.